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Unlicensed, unlimited 60 GHz mmWave

Paul Morris - CTO

Company history

2012 - 2013	2014 - 2015	2016	2017	2018	2019
•Metnet 28 GHz prototype installations with Vodafone and Telefonica	•480Mbps version deployed in China	•Dual channel node developed giving 1.2Gbps capacity •High gain option	•28GHz dual channel node installation in the City of London. •Started 60 GHz development	•Metnet60 trials and demonstrations	•60 GHz live network in London •Launched residential unit for FWA

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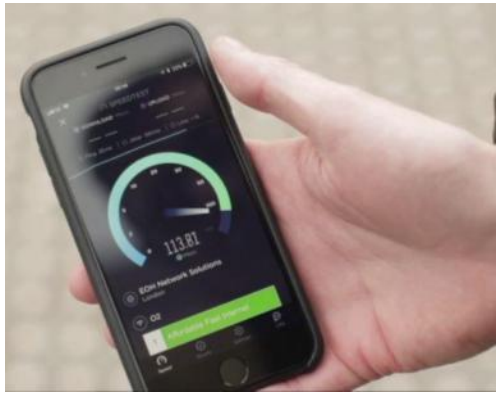
Telefonica London: Live SON backhaul mesh

- 250 Nodes deployed
- 42 fiber points
- Single unit per location
- Neutral host
- Wi-Fi & LTE small-cells
- Single 28GHz channel

- >70k Wi-Fi users daily
- 500 Mbps to the node
- ~150Mbps to the UE
- ~10ms latency to the UE
- Free to use



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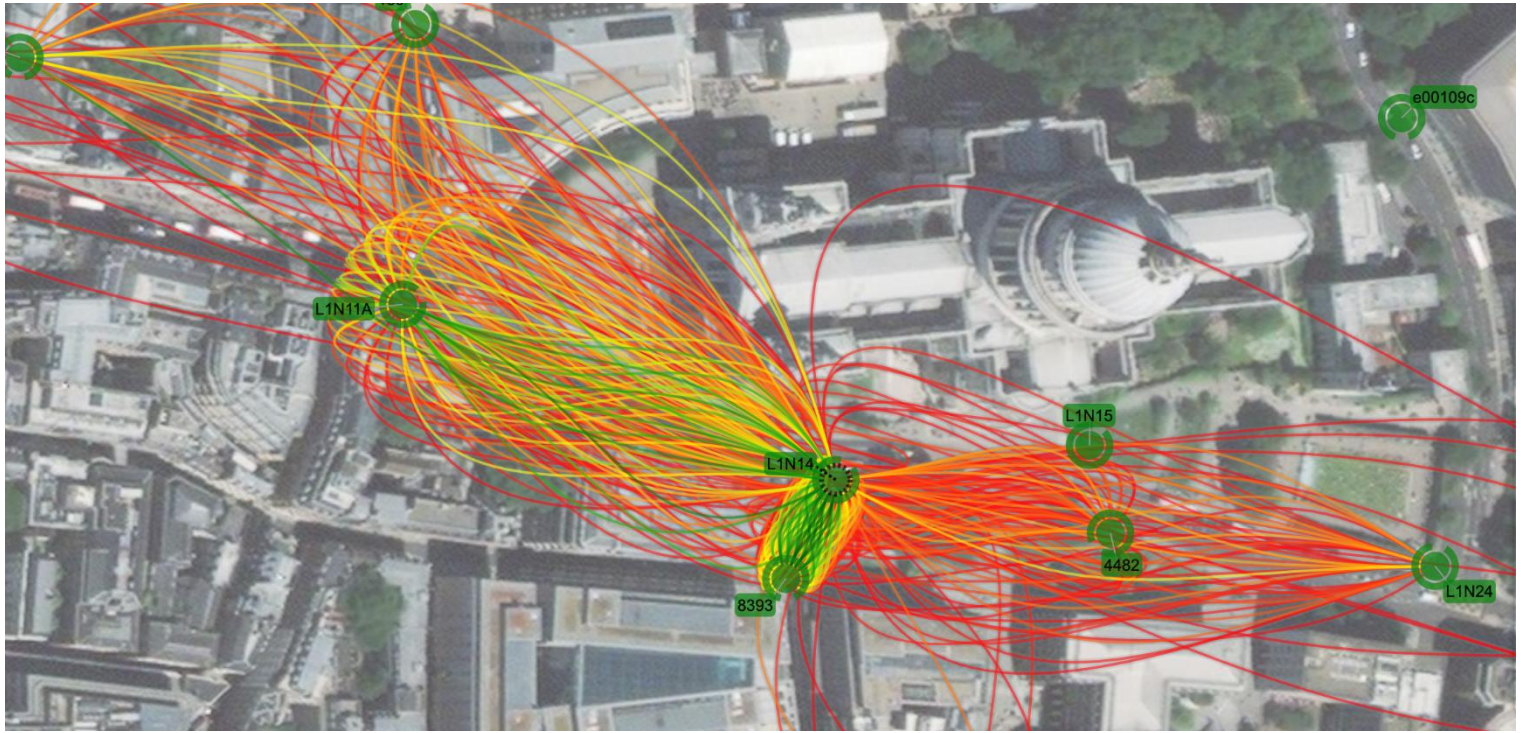
London mmWave – live multipath measurements



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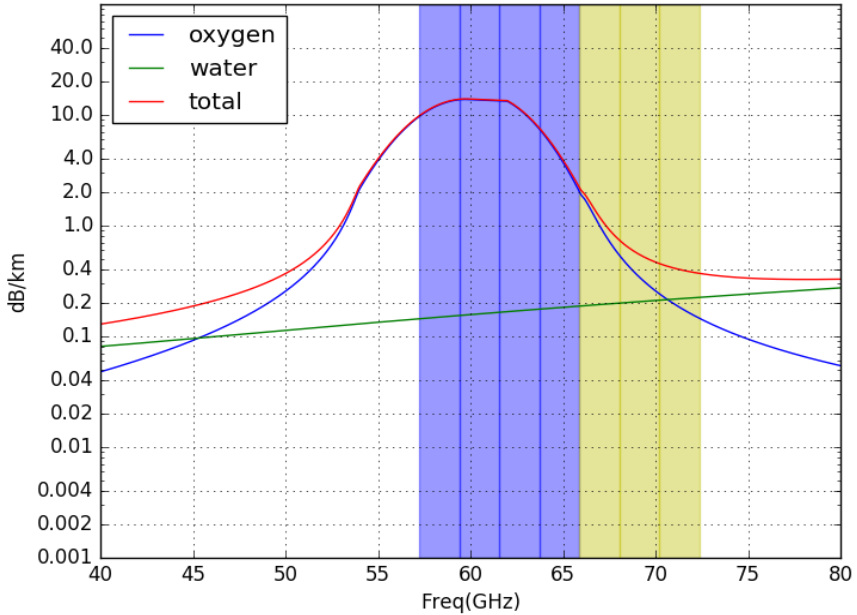
60 GHz increases the addressable market

- Auction 101 for 28 GHz and auction 102 for 24 GHz in the US
  - $702M bid for 101 and $1.98B bid for 102
  - Allocation of spectrum is underway
  - Bidders are both mobile and fixed network operators
  - Recent concerns over jamming 23.5 GHz which is needed for weather prediction
- 60 GHz unlicensed is already available in the UK, US and Australia
  - 6 channels are available (57-71 GHz)
- CEPT plan to update 60 GHz specs in mid-2019
  - 4 channels will be available (57-66 GHz)
- Other countries are reviewing and opening 60 GHz spectrum

60GHz link performance

- 300m link budget calculation
  - Tx EIRP = 40dBm
  - Ch 4 = 64.8 GHz
  - O2 absorption = 1.31dB
  - Path loss = 119.52 dB
  - Rain margin = 2.45 dB (Rp 0.01)
  - Antenna gain = 21dB
  - Rx SNR = 12.54 dB
  - MCS = 11 = 3.8Gbps @ L1
- Manageable impact from rain and O2 at short distances



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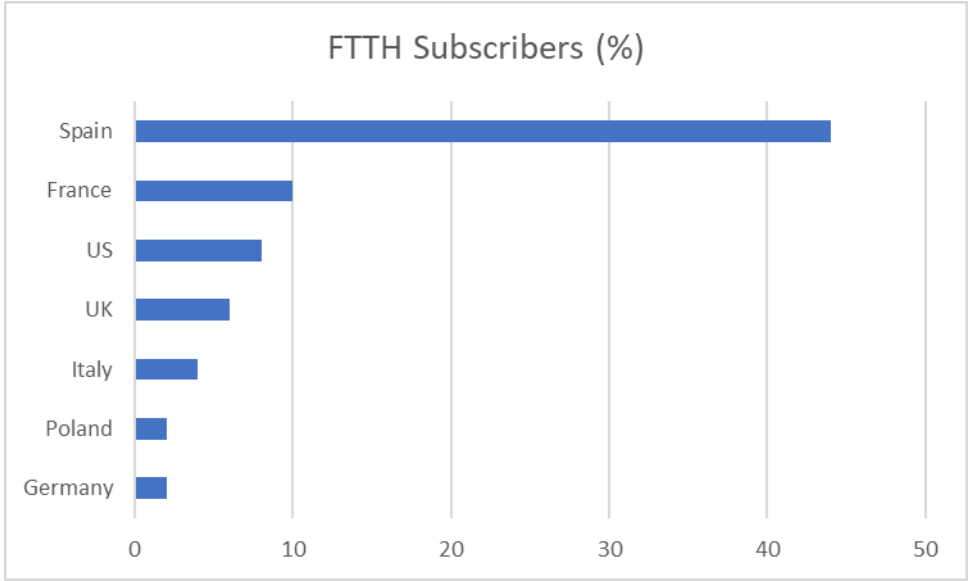
The demand for speed: GPON or equivalent

- Many countries have very low fibre penetration
- It will take years to roll-out and the upfront costs are high
- 60 GHz mesh can speed up the roll-out and smooth the cost impact of high-speed internet services



Source: IDATE for FTTH Council EUROPE, March 2019

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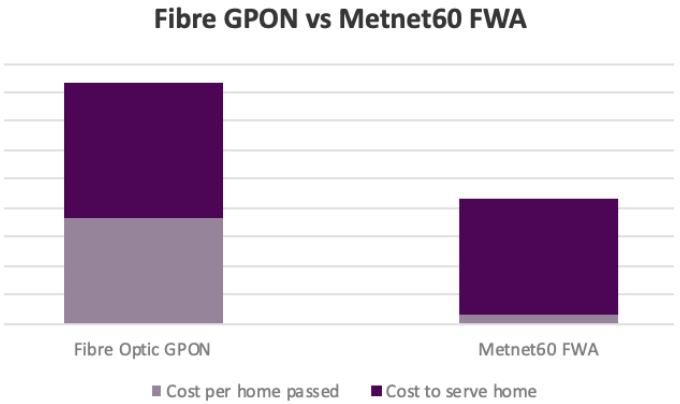
mmWave FWA vs Fibre Optic Broadband



48% cheaper than Fibre GPON network

Circa. $4m saving for a 10k suburban community deployment

Significantly faster roll out and time to revenue

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Industry is converging on 60 GHz mesh

- Telecom Infrastructure Project (TIP) has a mmWave working group
  - Channel sounding tools
  - Wi-Fi Alliance liaison
  - Smart City working group
  - Network planning

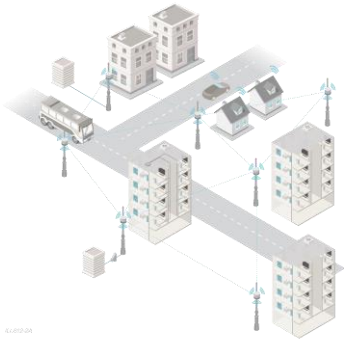
  https://telecominfraproject.com/

Facebook is promoting an ecosystem
https://terragraph.com/#terragraph

One 60 GHz network: multiple services

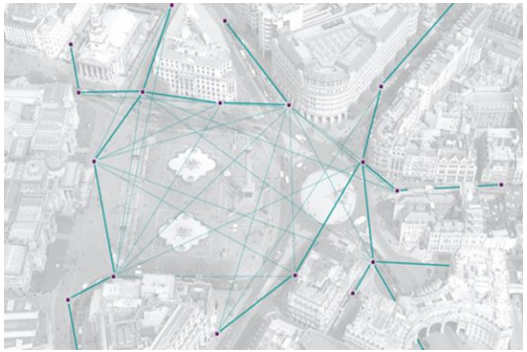
4G or 5G small cell backhaul

Gbit to rural locations



G.FAST and DSLAM backhaul

CCTV backhaul



One fault tolerant mesh

Gbit to historic city centres

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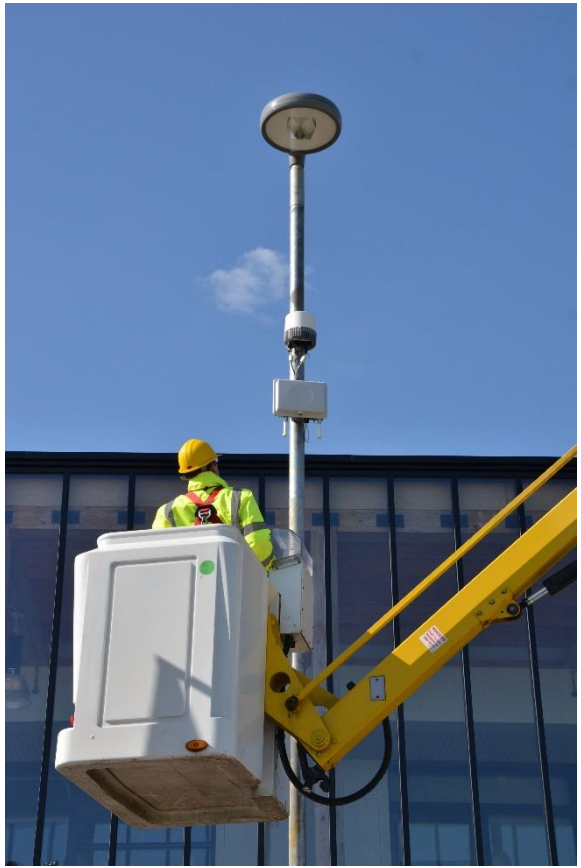
Quick and easy to deploy

- Install on existing lampposts
- 30 minutes per post
- Electronic beam steering means there is no need to line up accurately
- Fibre connection could be on a nearby building



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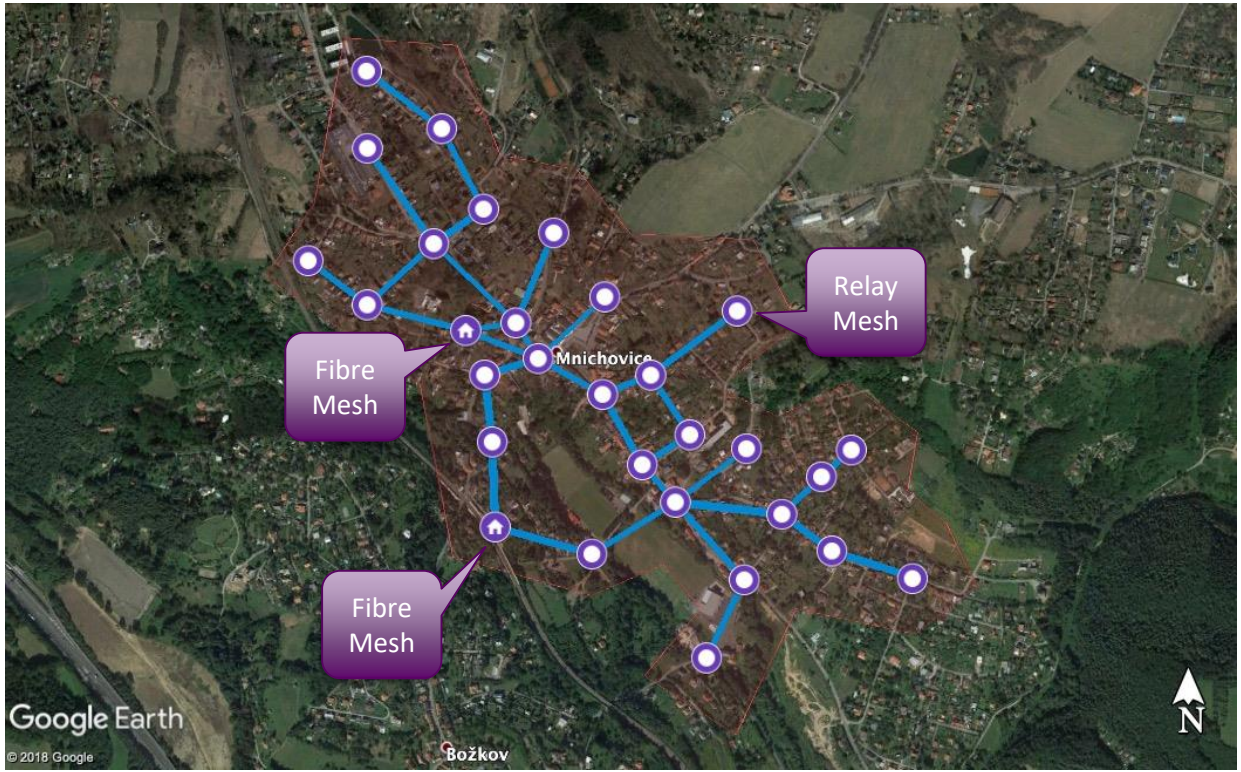
European Gigabit rural town



- Currently 10-50Mbps DSL service
- 1 KM covering approx. 2000 people
- 100Mbps to 1Gbps using 60GHz FWA
- 200 connected homes using Mesh and CPE's
- 2 x Fibre Sources
- 44% cheaper than fibre

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Ontix – 60GHz Neutral Host* in London

- CCS 60GHz Mesh in Bexleyheath and Westminster to deliver Neutral Host services
- Applications include WiFi and 4G/5G backhaul
- Infrastructure as a service based on existing street furniture and fibre network
- Bexleyheath WiFi backhaul network is deployed and live
- Future opportunity to provide Gigabit FWA to Enterprise locations

*Neutral Host is an infrastructure that can be used by multiple service providers

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Gigabit FWA – Rural Case Study

Delivering Gigabit FWA connectivity to rural Welsh village

Part of UK DCMS 5G Trials and testbed 5G RIT Project

Demonstrates use of unlicensed 60GHz band for FWA in a rural location

CCS 60GHz mesh nodes and CPEs deployed on houses connected to a high speed PtP link for backhaul to the ISP

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60 GHz mmWave

- Enables new markets
- Can be made quick and easy to deploy
- But needs a mesh topology with self-organisation & self-healing
- Compliments fibre deployments
- Has industry momentum and products available

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The world’s first self-organising mmWave backhaul and access

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