Atmospheric impact on the performance of a 60GHz point-to-point link for 5G infrastructures

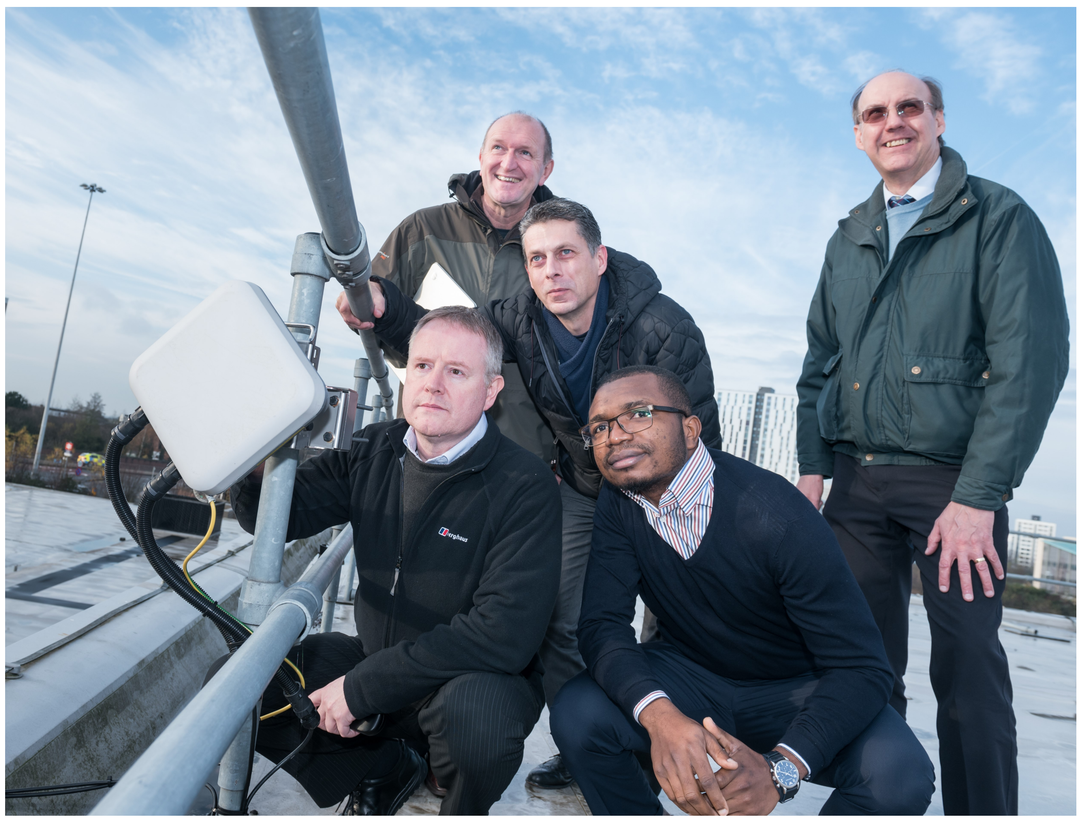
Nigel Linge[1], Rowani Odum[1], Steve Hill[1], Sabine Von-Hunerbein[1], Patrick Linnebank[2], Andy Sutton[3], Dave Townend[4]

5G will see the emergence of ultra-dense network infrastructures based on a small cell architecture. Such architectures will bring new challenges in the provision of backhaul and it is here where significant interest is being shown in the adoption of millimetre-wave solutions (30GHz to 300GHz).

Millimetre-wave spectrum offers the following advantages:

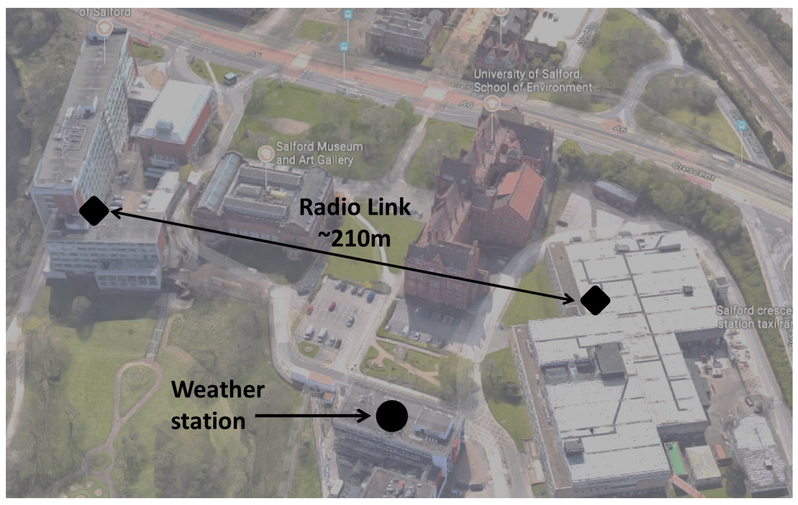
- attenuation due to atmospheric and moisture absorption limits the amount of interference between adjacent point-to-point backhaul links;
- narrow beam technology aids security.
- favourable license regime, often unlicensed, applies to frequencies within V-Band (57 to 66GHz).

However, there is also a need to better understand its resilience against varying weather conditions and over an extended period of time.



Aim:

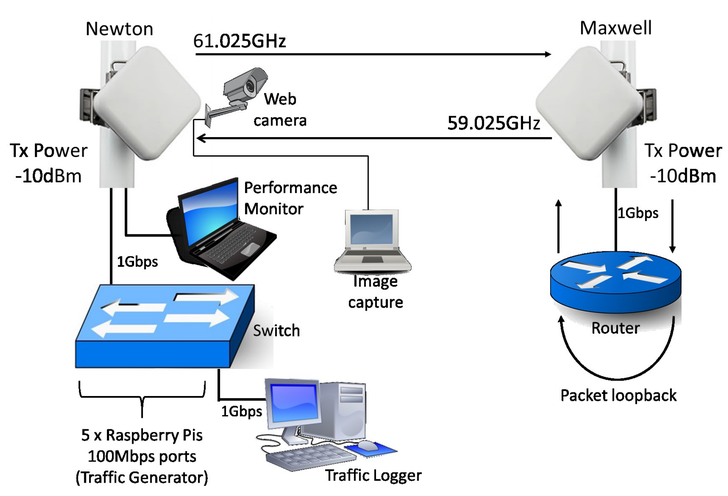
Establish a point to point 60GHz link on the University of Salford (UK) campus, and assess its operating performance against varying weather conditions over a period of 12 months.



A 60GHz link established between the Maxwell and Newton Buildings (approx. 210m) using two NEC iPASOLINK SX Advanced IP Radios.

Continuous data sent over the link at approx. 300Mbps.

Monitoring throughout and radio management information along with atmospheric data recorded by a nearby weather station.



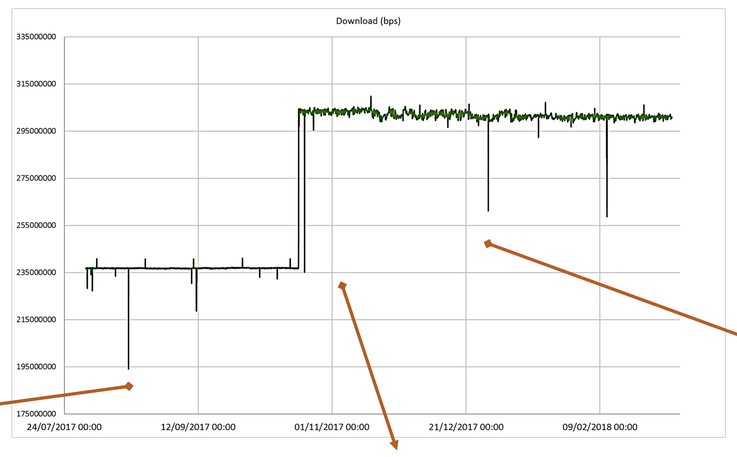
Initial Data Analysis:

Whilst the project is on-going, initial data analysis shows a clear correlation between link path loss and the rate of change of barometric pressure.

System throughput

(August 2017 to February 2018).

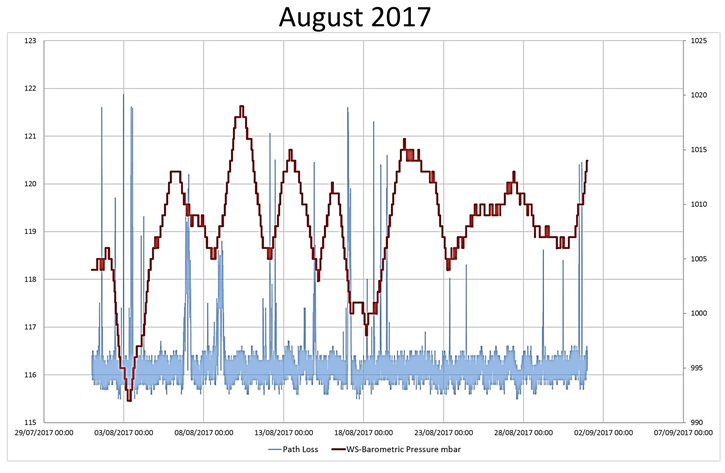
Reduction in throughout corresponds to periods of rapid change in the barometric pressure.



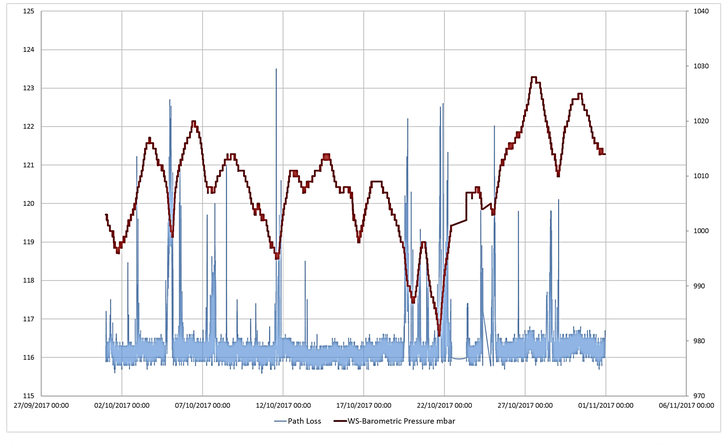
NOTE:

That the system throughput was upgraded in mid-October. Hence the step change visible in the graph.

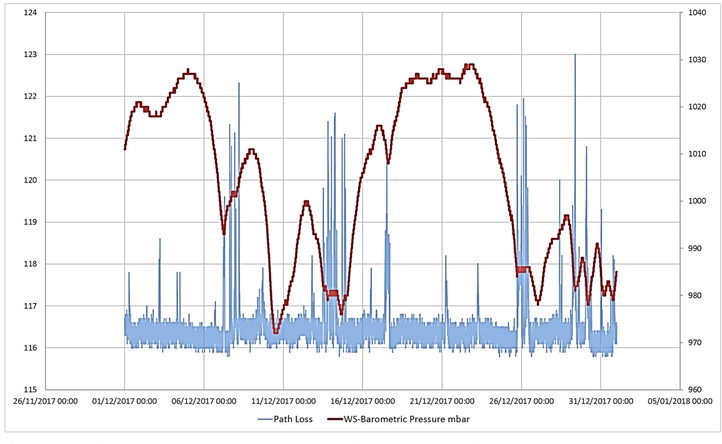
August 2017



November 2017



December 2017



Link path loss (dB) [blue trace] plotted against barometric pressure [red trace] for each of the three months highlighted.

CONTACT and Further Information:

For further information about this project, please contact: Professor Nigel Linge: n.linge@salford.ac.uk 0161 295 4759 @NigelLinge

[1] School of Computing, Science and Engineering, University of Salford, Salford, UK [2] NEC Europe, Amsterdam, Netherlands [3] Architecture and Strategy, BT Technology, Services and Operations, BT Centre, London, UK

[4] Wireless Research, BT Technology, Services and Operations, Adastral Park, Martlesham, Ipswich, UK