



Commercial opportunities of 5G for local authorities.

This briefing is provided to all APSE member authorities and will be of particular interest to those seeking income generation opportunities from council assets.

Key Issues:

- 5G mobile technology is in its infancy and will take several years to rollout
- An opportunity exists for local authorities to rent antennae space on lighting columns and other sites
- Asset registers of lighting columns with GIS data will need to be shared with partners and telecom operators to facilitate use of existing assets
- Health & Safety concerns have been vastly overstated and have no basis in fact

Background

The need for fast and efficient data networks is increasing exponentially and with most users accessing content through mobile smart phones the need for a reliable wireless network is critical. In addition, there are a growing number of smart devices in our homes and in our streets that rely on the same networks. Much has been written on the applications, big data, 'internet of things' and 'Smart Cities', however less on actually building the infrastructure to support this.

In 2019 APSE formed a working group of local authorities to investigate the state of play with 5G, the opportunities for local authorities to assist in the rollout and the potential to generate revenue by use of council assets, primarily existing lighting columns as bases for 5G antennae.

This briefing concentrates on the commercial opportunities and infrastructure requirements. Applications of 5G to assist councils will be addressed separately.

What is 5G

5G is the fifth generation of wireless communications technologies supporting cellular data networks. It offers a substantial improvement on previous technologies, providing higher speeds, no delays and the opportunity to connect millions of devices to the internet. Large scale adoption began in 2019 although the infrastructure to date is mainly only available in some city centre locations using existing 4G antennae sites

Infrastructure

A millimetre wave 5G network requires multiple antennae (approximately 5 times more than for 4G). The ideal spacing is between 150 and 280 metres at a height greater than 8 metres. One in three antennae requires a link to a fibre data cable. Dependent on the location and likely data traffic, each antennae may carry up to 40 micro-antennae. The antennae will require power and this could be several KW for busier sites.

Existing Council Assets

Upper tier authorities are the statutory highways authority and are responsible for the street lighting network. From the early days of mobile technology, lighting columns have been used as locations for mobile network antennae. Lighting columns are usually between 6 and 12 metres in height and spaced no more than 180 metres apart.

Over the last decade, all authorities have had a programme to replace older street-lighting with low energy LED equivalents. Many are now 100% LED and others are not far behind. Additionally most have a programme to renew lighting columns on a rolling basis, with the priority on replacement of those made of concrete. The reduction in energy requirement would suggest that there is some excess power capacity within the existing distribution system. The distribution system is owned and operated by the regional distribution network operator (DNO)

Some local authorities, notably Bristol and Doncaster, own extensive fibre networks and the associated trunking which have the capacity to be take additional data traffic and/or additional cabling.

Councils have used technology to bring together their asset records. Many operate a Graphical Information System (GIS) with the location of street-lighting and other street furniture captured amongst a host of other highways and building data. This is augmented with specific asset management systems utilised to manage the street-lighting element.

The opportunity

The rollout of a 5G network is a highly expensive operation and will only happen if driven by customer demand, generating the revenue necessary to make it viable for the Mobile Network Operators (MNO). The restraints on rollout are significant, especially if new masts have to be installed and roads and pavements dug up to place new fibre and power lines. Planning issues can also slow down this process.

Street lighting offers a 'ready-made' location for 5G antennae. The columns already have a power supply and usually have capacity to take additional cabling. They therefore offer the potential to significantly reduce the costs of 5G rollout by integration with the existing street-lighting network and potentially council buildings.

As with existing mobile networks, where antennae are located on a building, the MNO pays a yearly rental charge. Whilst it is too early to determine the price for this, an average figure of between £100 and £200 a year would not seem extreme. Too high a price and the MNO will seek to install their own columns as is their legal right. Over a Borough area this could amount to a significant annual income. Current data for APSE Performance Networks suggests that the current yearly cost of maintaining each lighting column (including rolling replacement) is £88.29 and yearly electricity cost for the lantern £34.33.

Remaining challenges

There is no common standard for lighting columns and manufacturers are now offering '5G ready' columns to lighting engineers. Like 'future proofed' televisions before them, these claims are unlikely to withstand the test of time. APSE is aware of work by WM5G to explore a common BSI standard for the passive part of lighting columns, but this is at an early stage. With technology developing, the necessary load bearing capacities required can only be estimated at this time.

Software packages are in development that pull in street and building data to calculate the most efficient locations for antennae. Overlaying these with the location of lighting columns allows the planner to manually move the antenna locations to the nearest available column. Ideally this can be automated, but at the moment it's a manual process.

The Electronic Communications Code 2017, gives operators the statutory right to install and maintain apparatus such as phone masts, exchanges and cabinets on public and private land. Some Authorities have signed exclusivity agreements over their assets with 5G operators, although this is likely to be challenged in the courts shortly. Whilst it might mean 'money up front' it will ultimately hinder the rollout of 5G and a non-exclusive route should be sought. Planning consent where necessary should endeavour to cover a network rather than individual antennae.

Health Concerns

Over the last year, concern has been raised about the safety of 5G and its effect on the human body. These articles have ranged from exaggerations of the potential heating effects, to spying and latterly responsibility for Coronavirus. In response, The International Commission on Non Ionizing Radiation Protection (ICNIRP) have reissued their guidelines for limiting exposure to electromagnetic fields (100 Khz to 300 Ghz) and the UK's IE&T have published 'Electromagnetic fields and health! There is no evidence of any ill effects from 5G frequencies

<https://www.icnirp.org/en/activities/news/news-article/rf-guidelines-2020-published.html>

<https://www.theiet.org/media/3104/emfhealth.pdf>

APSE Comment

5G is an exciting technology which will bring many benefits to councils, businesses and residents. It is however several years away from wide scale implementation, thus allowing many of the applications to operate successfully over wider geographic areas. It is to be encouraged and that means a positive engagement with Telecom companies to facilitate the rollout. There will be a financial benefit to Councils, but it will match the expansion of 5G and grow over the next five years.

APSE aim to publish the findings of the 5G working group in Autumn 2020

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