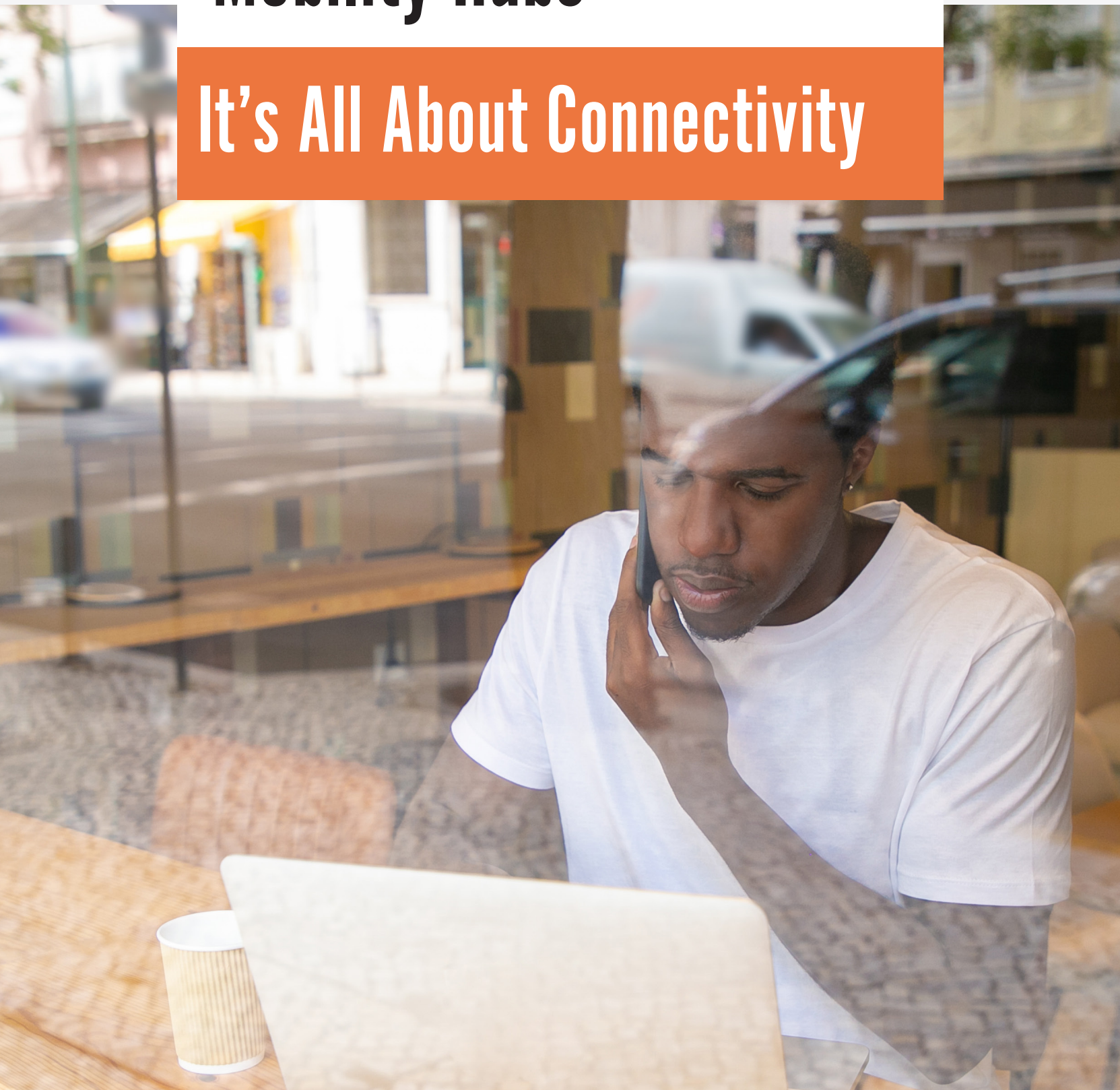


# Mobility Hubs

It's All About Connectivity



This is the third in a series of four articles discussing the concept of Mobility Hubs and how they can address many of the challenges of sustainable transport in our cities. The first two articles ([available here](#)) have concentrated on the physical movement of people and goods - the mobility aspect of Hubs. However, as implied by the inclusion of Communications as a key pillar of the concept right at the start of these articles, connectivity can have a much wider meaning.

## CONNECTIVITY vs MOBILITY

It's clear that mobility is all about connectivity, but connectivity isn't just about mobility. We have seen over recent months that in many cases physical connectivity can be substituted by virtual options – think of all those Zoom calls that have replaced face-to-face meetings. Clearly there remain advantages to meeting in person, we are a social animal after all, but as we emerge into a New Normal following the pandemic, it remains unclear how the balance between physical and virtual connectivity will change. The question then is: what role do future Mobility Hubs have in this blended environment, and how can they help our cities become Smarter?

Many current and future applications that support new mobility solutions, and the wider smart city concept, depend heavily on data and analytics. This can range from connected devices providing data to a centralised management function, to the analysis of huge variety of data sources, varying from simple sensor readings to multiple HD video streams. All these applications require computing power, data storage and fast network connections. One answer is to do all this is processing in the Cloud. While this gives the ability to scale both computing and data requirements as needed, relying on the cloud has some significant limitations around bandwidth, latency<sup>1</sup>, reliability and security.

<sup>1</sup> Latency is a basically a measure of the delay between sending a request and getting the answer. This can be because delays in communication (think satellite TV interviews) or processing (think Netflix buffering when starting a movie).

<sup>2</sup> Volume and Velocity are two of the up-to 7 Vs of Big Data. The original two others being Veracity and Varsity to which Value, Variability and Visualisation have since been added (<http://www.prathapkudupublog.com/2018/01/7-vs-of-b.ig-data.html>)





This has given rise to the concept of Edge computing. There is no clear, single definition of what this is, but at its heart it is the idea of bringing Cloud capabilities closer to where the data is generated, analysed and used. This reduces data transfer times/volumes, particularly in situations where there isn't an end-to-end fibre connection, such as in the home or for mobile users. Processing at the edge allows more rapid applications and can significantly reduce the latency in the system and it is this low latency that makes edge compute important for many new and emerging services.

As the amount and speed<sup>2</sup> of data piped to and from a centralised resource becomes less and less efficient, [Micro Data Centres](#) are needed to provide computing and storage capability where it is needed. [Gartner](#) has predicted that the amount of enterprise data that will

be generated and processed outside of the traditional data centre will rise from 10% to 75% by 2025. This trend will also be seen in consumer demand, with the increased use of online work applications (such as Office 365) as more of us work from home, and the massive increase in demand for video streaming, on-line gaming, and other data heavy services. Holding data in smaller data centres, nearer to the user provides a number of benefits in speed, privacy and security.

This makes the Communications pillar of the Mobility Hub concept an exciting opportunity to enable new data driven services, including the secure hosting and management of the Micro Data Centre infrastructure necessary to meet the need for edge computing.





# ➤ POSSIBLE USE CASES

A Micro Data Centre hosted at a Mobility Hub in the community will open up a whole range of potential use cases where reducing data transfer volumes, and low network latency (and local compute power) can bring advantages. For example, [ZDNet](#) identified a number of scenarios where edge computing can bring value.

These include:

- Connected and Autonomous Vehicles
- Industrial Automation
- Connected homes and offices
- Predictive Maintenance
- Video monitoring
- Software defined networks

Some of these are directly relevant to the physical transport side of Mobility Hubs, such as management of Connected and Autonomous Vehicles, V2X connectivity<sup>3</sup>, video analysis and analytics for predictive maintenance. For other applications a computing and data storage facility based at an urban Hub would be ideally placed to service the increasing demand from home, industry and mobile users that don't have end-to-end fibre connectivity.

The last of the ZDNet scenarios, Software Defined Networks (SDNs), are of particular interest in the communications sector especially around the roll-out of new 5G mobile networks.

<sup>3</sup> V2X refers to the connection of Vehicles to Everything. This is a superset of Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) and also include, for example, the connection of vehicles to personal devices.



# ➤ 5G AND THE EDGE

One of the key advantages that Edge compute brings to 5G is the reduction in latency over existing networks. It is this low latency, together with significantly increase bandwidth, that is one of the key selling point of 5G. Very low latency (typically a few milliseconds), together with data localisation and more efficient processing, is vital for new applications such as industrial automation, drone navigation, V2X communication and new infotainment concepts including Augmented or Virtual Reality.

To accomplish this, 5G networks depend on a range of new technical advances that move many of the key network component from hardware to software. This change, for example in the development

of Software Defined Radio Access [Networks](#), that manage the connection from the handset to the mast, requires significant computing power. However, Software Defined Networks allow service providers to consolidate the processing away from the mast at a more central location. The International Telecom Union [have recognised](#) that delivering the ultra-low latency envisaged for 5G Networks will need both significant changes in network architecture and the use of more local data centres that move content closer to the end user, particularly around time critical applications. This is where Micro Data Centres co-located with local Mobility Hubs come in.





# ➤ WHAT DOES THIS MEAN FOR MOBILITY HUBS?

The world of mobility and communications are both changing at an exceptional rate. Not only are new technologies being developed and deployed faster than ever, the inter-relation between these technologies is changing as the balance between the physical and virtual shifts. It has become clear over the last few months, as we have been forced to consider new ways of working and doing business, that mobility and connectivity are fungible in many ways and this interchangeability is only going to grow.

Linking Place, Power and Comms, allows us to place the Mobility Hub concept firmly at the heart of the wider idea of connectivity. By combining the movement of people and goods with the underpinning data and processing infrastructure needed for the development of Smart Cities and the next generation of communication technologies, we can create a whole range of exciting new opportunities to deliver commercial and social value.



In my final blog in this series, I will try to bring together the concepts from this and previous articles and contextualise them in tangible use cases in the setting of SMLL and London. I will explore how the ideas presented can be combined to develop the next generation of

Mobility/Connectivity Hub that meets the need to sustainably moving people, goods and data around our cities and that can enable new and emerging technologies to make our cities cleaner, more efficient and better places to live.

# ➤ START A CONVERSATION



Smart  
Mobility  
Living Lab  
London

Beata Szoboszlai

bszoboszlai@trl.co.uk



Kim Smith

kim.smith@dgcities.com

## ▶ ABOUT THE AUTHOR

Dr. Miles Elsdon spent 10 years in Whitehall most recently as chief scientist in the Department for Transport. He currently works as a consultant advising on strategy, innovation and technology in Mobility, IoT, AI and Cyber. Miles is a fellow of the IET and a Visiting Professor at UCL.



## ▶ OTHER PAPERS IN THIS SERIES

# 1 – [Mobility Hubs – Introducing the concept](#)

# 2 – [Mobility Hubs - The next generation](#)

# 4 – London as a place to experiment (coming soon)



Smart  
Mobility  
Living Lab  
London

info@smartmobility.london

[www.smartmobility.london](http://www.smartmobility.london)

SMLL is a TRL company.

Copyright SMLL 2020.