

Will terms such as HALO and LEOs enabled MNOs be common terms by 2030, as GPS and 5G are now?

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As we move through the 2020s, will these two terms become common in the mobile 'phone and broadband ecosystems, or fade away as the terms WAP and Fax have since the 2000s?

As a digital architect in Capgemini Invent, my role across businesses in assessing the technologies available and their use to deliver enhanced customer and client value, is key. With access through Capgemini to teams who have done, are doing and will provide digital service delivery across industries, and as Capgemini is the world's number one provider of research and insights in technology, this allows Invent colleagues to access information about their impact to our clients. It also enables me to dive into information on technologies that may help address and unlock future capabilities in other areas of interest to me around the identification of individuals, managing identification data and consumer payments (well worth checking out as so much research is published and available to all: <https://www.capgemini.com/gb-en/research-institute/>).

Recently, my supporting work for an Electric Heavy Vehicle client Elon Musk's 'Starlink' network came to mind, due to the multiple IoT-connected components within their new product and the issues around collecting this data from vehicles in remote locations. This got me thinking about the impact on world-wide communications and the sustainability of satellites. I then remembered seeing a Capgemini PR release about sustainable high-altitude platforms providing 5G communications over significant areas for long periods of time - days rather than just a few hours: <https://www.capgemini.com/gb-en/news/cambridge-consultants-building-the-worlds-largest-commercial-airborne-antenna/>). Both technologies have now brought new technical abbreviations into my vocabulary, 'HALO' and 'LEOs'. Firstly, let's understand these terms and secondly how they may impact digital services and when, why and how some services may be accessed in the future.

'Starlink' and other satellite internet and voice communication services use Low Earth Orbit satellites (LEOs) technology to access the internet at high speed with relatively low latency. These 'LEOs' network devices can then be connected to local networks via WIFI to enable general-use devices to access the internet in areas where there is no fibre, copper or microwave (direct line of sight) availability or connectivity. Therefore, mobile systems and devices connected to a LEOs network still require a base-station-type infrastructure (including power) to provide access in a wider area than, say, a WIFI hotspot. This means that the costs for a base-station-type infrastructure still make it uneconomic for an area of low usage. LEOs-connected base stations are becoming part of mobile networks, but more likely as part of their resilience and capacity planning tooling for urban areas without access to fast internet. (<https://www.fiercewireless.com/wireless/vodafone-works-ast-spacemobile-close-digital-divide>)

'HALO' (High Altitude Long Operations) is the term for a group of emerging technologies that will enable mobile networks to create near 100% geographical coverage for mobile devices using 4G, 5G and onwards mobile connectivity. The potential for these HALO technologies is to deliver an even more global 'inclusive' mobile communications infrastructure. The key features are the ability to cover both large areas, reducing 'black spots', that can be accessed using frequencies and components that are common in mobile devices today: self-powered and probably connected to LEOs.

For HALOs, the platform technology is less mature than for LEOs that have been developed through the and integration of communications satellite technologies since the mid 70s. HALO technologies are being developed from the unmanned drone technologies that became available from the early 2000s. The work to find the right HALO technology is currently ongoing, with different aircraft/airship designs being prototyped with a focus on their sustainability through solar and hydrogen power on a reusable craft.

Therefore, the need for the wide area coverage offered by HALO infrastructures connected to LEOs is likely to increase their value to mobile networks. This, coupled with their lower deployment costs to the traditional mobile network base-stations with microwave relays, should make them commercially viable once the technology challenges are overcome. Indeed, in the UK – with the planned replacement of the PSTN network, a self-powered infrastructure becomes an increased priority that may drive deployment of household LEOs devices to remote locations in the short term. This could also provide the fast internet connectivity required by these isolated communities.

Once commercial solutions become economically viable, their manufacture and deployment is likely. This is due to the need for internet-connected services in remote areas and for mobile network resilience to demand spikes and unforeseen events. These two technologies are therefore likely to provide the capabilities that currently constrain digital services from becoming truly ubiquitous: which brings me back to the needs of technologies for consumer payments and citizen identity to be available to all, everywhere.

The Tonga volcano eruption breaking the physical communications cable may provide the data modelling to support the future viability of HALO platforms connected to LEOs, with 5 weeks to restore general internet connectivity (<https://www.bbc.co.uk/news/world-asia-60458303>) and 5 days required for deployment of new satellite equipment using LEOs (<https://www.satellitetoday.com/telecom/2022/01/21/satellite-operators-restore-critical-communications-to-tonga-after-volcanic-eruption/>). Could future HALO platforms supported by LEOs help to reduce these times further? Also, would these services be delivered at a cost level to provide permanently a level of resilience by default, as well as further connecting remote communities or individuals with a mobile device? Only time will tell.

Looking back at terrestrial television, after over 60 years since initial deployment of 95% coverage (<https://blog.scienceandmediamuseum.org.uk/history-of-british-television-timeline/>) was increased to around 98.5% in that time: with above 98.5% coverage by 2012, deployed only through regulation. Since the 1990s, it was satellite broadcast TV that provided the solutions for nearly all households to access TV in the UK and Ireland. Will it be LEOs that provide household access to all and HALO platforms that deliver this to mobile networks?

The importance, therefore, of LEOs and HALO to people in locations constrained by a lack of always-available internet access should drive their rapid commercial development and deployment to help deliver digital services to all, in what will need to be – and will be – a more sustainable way. I do believe that we may all soon start hearing about HALO-equipped mobile networks connected to LEOs.