The Alluring Promise of 5G

Imagine a world in which high-speed internet is available everywhere, writes Wim van Wegen in his latest column. Perhaps you've just ticked skydiving in the Grand Canyon off your bucket list and are keen to share the breathtaking video footage with your family and friends back home (even if they live in a rural backwater). Wouldn't it be great to be able to transfer gigabytes of data to any corner of the planet in the blink of an eye, using just your smartphone? Not so long ago this indeed belonged in the realms of science fiction, but it is now on the horizon and will one day become the new reality. Admittedly this might be a slight exaggeration, but it can do no harm to bring the groundbreaking phenomenon called '5G' to your attention, because it is likely to add a whole new dimension to life as we know it – and that includes the surveying profession.

So what exactly can the geospatial industry expect of 5G? With a potential data capacity of 5G, the next generation of mobile broadband is about 100 times faster than 4G and 20 times faster than the long-term evolution (LTE) standard for mobile communication. Hence, with its extremely high bandwidth, ultra-low latency (which is by far the biggest benefit) and high-density connections, 5G is set to eclipse 4G and open up a huge array of new applications that are currently impossible using today's network standards. Needless to say, these new use cases will include a multitude of geospatial applications.

Self-driving cars

Autonomous driving is just one good example of how the surveying profession will benefit from 5G. Thanks in particular to the ultra-low latency, vehicles will be able to constantly receive and also transmit real-time data along their route, including information about roadworks, diversions, driving conditions and congestion. This will also make it possible to update road maps automatically and distribute the updated information to other (autonomous) vehicles in the vicinity.

The collection of cellular-based RTK GNSS data itself is another area that will receive a boost from the rollout of 5G. Currently, office-based staff and fieldworkers can be connected in real time during data capture for operations with a relatively small volume of data, such as GNSS control surveys. With 5G, this can potentially be expanded to include high-volume data such as Lidar or aerial photography, so that the incoming data can be analysed almost simultaneously (and perhaps even automatically). This has numerous advantages; in addition to a significantly less time-consuming and hence less-costly survey process, real-time data analysis also means real-time feedback of meaningful information for faster and more effective decision-making.

Turning our attention to unmanned aerial vehicles (UAVs or 'drones') – or perhaps it is more appropriate to refer to unmanned aerials systems (UASs), since is not merely about the drones, but also about the sensors they carry – these surveying tools potentially stand to benefit most from 5G. In fact, the UAS is a disruptive technology that almost seems to have been waiting for cellular mobile communications and the Internet of Things (IoT) to catch up. The 'dream team' of UAVs, sensors, 5G and IoT holds the alluring promise of facilitating unprecedented mapping and surveying tasks. For example, thanks to its real-time data capabilities, 5G will make it possible for drone flight paths to be altered even during the survey using the real-time-captured data. When combined with the IoT, this could be done from virtually anywhere with an internet connection without even needing a dedicated solution. This combination of platforms, real-time data transmission and the IoT will open up huge potential for the efficient, safe and cost-effective (thanks in particular to labour savings) mapping of urban environments. As a result, we can expect the 'smart city' trend to really take off.

Precision agriculture

Another area that could experience tremendous gains from 5G is precision agriculture. Just some examples of possible applications include monitoring crop health, detecting irrigation problems and collecting information on soil variation. 5G will improve the speed and convenience and even autonomy of such activities, thus driving the further adoption of technology in farming and hopefully even helping society to tackle the looming global food shortage.

It goes without saying that we still have some way to go. Although comprehensive rollouts are expected from as soon as 2020 onwards, expert opinions vary on the speed of the 5G expansion over the next five years and it will certainly take much longer before there is truly global coverage. But we are moving ever closer to that dot on the horizon – and 5G is likely to revolutionize the surveying industry long before we actually reach it.