# SYSTEMICS PAB
Network Quality Experts

Benchmark Measurements
of 5G performance in Dublin
show Three as the operator
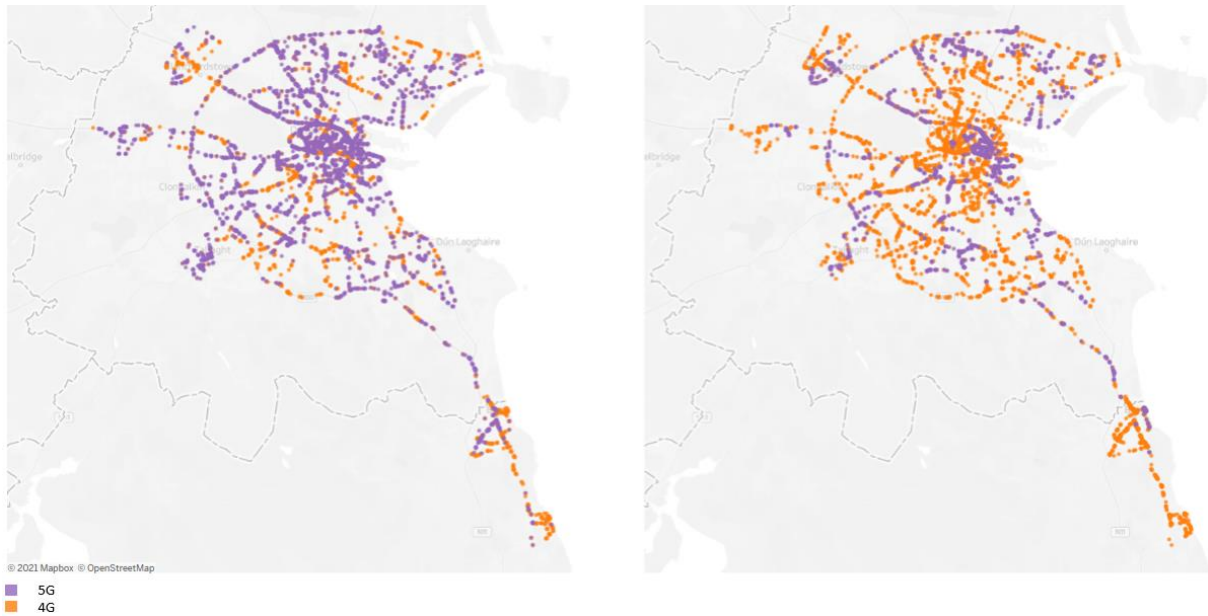with the best 5G network

Summary of the Results

In a survey of 5G performance conducted by Systemics-PAB in Dublin, the network of Three came on top with the highest average throughput during data download and upload. Three also has the largest 5G coverage in Dublin.

Picture 1 – 5G Coverage of Three

5G
4G
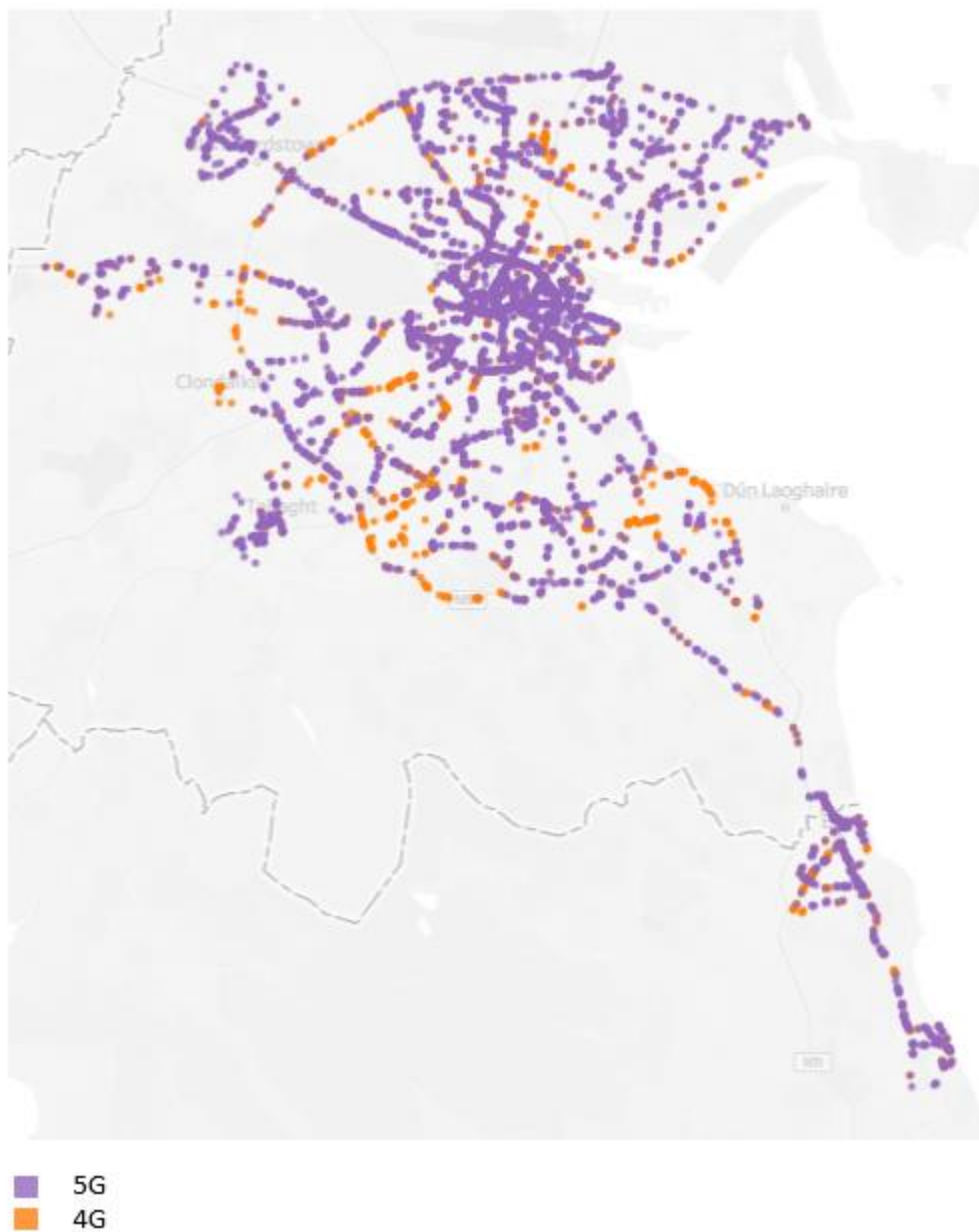
Picture 2 – 5G Coverage of competitors

5G
4G

Picture 3 – Top level results

	3	Operator B	Operator C
% of tests using 5G	**85%**	68%	31%
Download transfer average throughput [Mbps]	**325**	253	119
Download transfer throughput 10th percentile [Mbps]	**41**	10	11
Upload transfer average throughput [Mbps]	**55.6**	44.9	39.3
Upload transfer throughput 10th percentile [Mbps]	6.9	8.9	**14.2**

The results show a clear performance advantage of Three which is achieved thanks to the most extensive 5G coverage in Dublin. Average download throughput of 325 Mbps is one of the highest results we have recorded in our network benchmark projects in a test of the whole city. 10th percentile result of 41 Mbps is also impressive. It means that in our survey 90% of download transfer tests conducted in Three's network achieved a download speed of at least 41 Mbps.

Geographical coverage of the measurements

Our aim was to do a comprehensive survey of mobile networks performance in Dublin. In our test route we included all regions of Dublin to make a holistic assessment of mobile data services in Dublin. Drive route also included Bray and some of the residential areas outside of M50.

Picture 4 – Drive route

How the survey was conducted

The measurements were conducted by a measurement car equipped with a Rohde & Schwarz Smart Benchmarker System. As the test terminal we used Samsung Galaxy S20+. Terminals and SIM cards had all radio technologies enabled and would freely select 5G where available or use 4G when 5G would not be an optimal technology choice. Test system also included TSME-6 radio scanner from Rohde & Schwarz.

7s file transfer test was used to measure data transfer network performance. It is a test where a very large file is being transferred for 7 seconds and after that time data connection is terminated.

Measurements were performed at the end of May 2021.

Test results

5G usage

The driveroute that we selected for the test covered not only Dublin city centre but also included all residential areas inside M50. 7 sec data download test used in our survey was executed in the highest available radio technology. In Dublin Three achieved an impressive 85% of tests where 5G technology was used, compared with 68% and 31% of two other operators.

Picture 5. Technology usage, 7s data download test
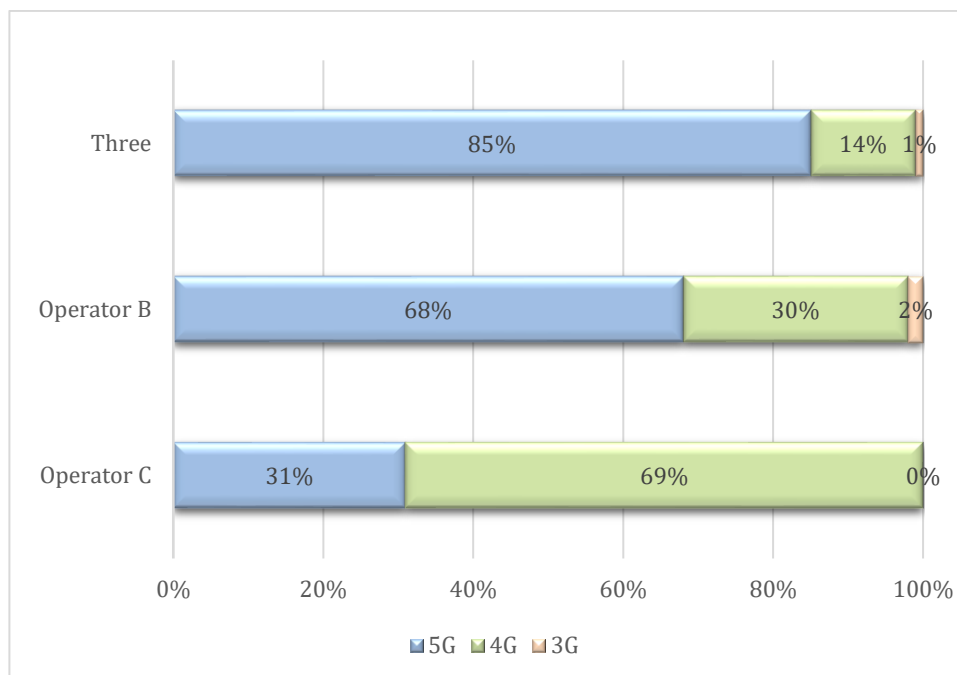
Overall results (All Technologies)

Overall results are presented in the table below. Average download and upload throughputs are highest for Three. Average download throughput of 325 Mbps is more than 20% higher than second ranked operator with the result of 253 Mbps. More importantly the 10th percentile value of 41 Mbps is 4 times higher than the results of the competition. It means that only 10% of download tests achieved the throughput lower than 41 Mbps, while 90% of tests had a throughput of at least 41 Mbps. In data upload Three also had an advantage over two other operators achieving average upload throughput of 55.6 Mbps.
Ping values that represent packets transmision latency show Three with the best (lowest) result.

Table 2 – Overall results, 7s data download and upload test, all technologies

	3	Operator B	Operator C
Download average throughput [Mbps]	**325**	253	119
Download 10th percentile throughput [Mbps]	**41**	10	11
Upload average throughput [Mbps]	**55.6**	44.9	39.3
Upload 10th percentile throughput [Mbps]	6.9	8.9	**14.2**
Ping average [ms]	**30**	32	43

5G results

In the table below we present the results of the tests performed in 5G. It includes 5G in 3.5 Mhz dedicated frequency band and also lower bands where 5G shares the frequency bands with 4G technology. It is a subset of the results presented in Table 2 where tests that didn't involve 5G technology were excluded. Comparison of the throughput results in 5G show an advantage of Three in terms of 5G network performance over two other operators. In 5G only tests Three's results are similar to overall results shown in Table 2. This comes from the fact that 85% of tests in Three's network were performed in 5G. For two other operators 5G only results show significant increase of the average throughput values.

Table 3 – 5G results, 7s data download and upload test, 3G and 4G technologies excluded

	3	Operator B	Operator C
Download average throughput [Mbps]	**358**	344	266
Download 10th percentile throughput [Mbps]	**84**	44	30
Upload average throughput [Mbps]	**60.7**	55.2	55.1
Upload 10th percentile throughput [Mbps]	9.7	11.8	**13.7**
Ping average [ms]	**29**	30	39

Latency values for 5G only tests show very similar results as overall results . Single digit latency values which is one of the goals of 5G will be achievable when 5G stand alone networks are deployed. At the moment 5G network utilises common core network which is the same for both 4G and 5G connections, therefore the latency differences in 5G tests are relatively small compared with overall latency values presented in Table 2.

Systemics-PAB

Systemics-PAB is a leading provider of independent Quality of Experience benchmarking services for mobile operators and regulators. We have conducted various benchmarking campaigns of mobile networks in more than 50 countries representing among others Eurasia, Middle East, Africa, and Australia.

Our mission is to assist customers to understand and address the variety of issues affecting quality in mobile and fixed telecommunication networks. Expert know-how developed over many years, combined with large-scale operations and efficient cloud-based data post processing, gives us an unparalleled flexibility in conducting high-quality and complex projects in multiple countries worldwide. From 2017 Systemics-PAB is a certified partner of Rohde & Schwarz in the mobile networks testing domain. Systemics-PAB has also been a contributing member of ETSI working group developing guidance for Quality of Services testing in mobile networks.