

5G and COVID-19: It Merits a Closer Look

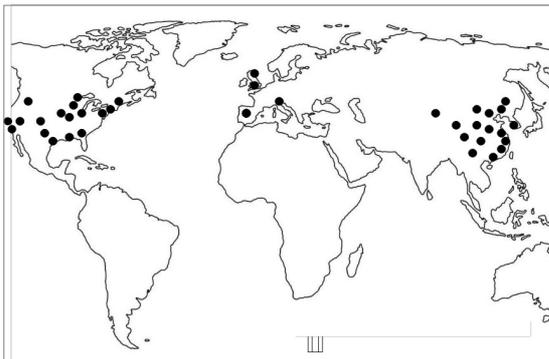
Michael Warden, 9th May 2020

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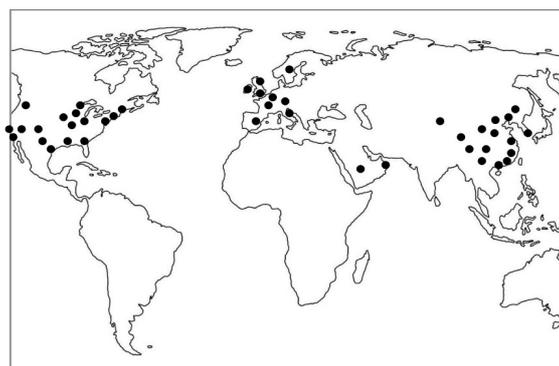
The Story: Persistent reports of a link between 5G and Covid-19. Strident refutations by politicians. Censorship in the media. Attacks on communications masts in various countries. Who is spreading this 'dangerous nonsense'? It fact, not just 'crazy people and rumour-mongers'. There are well-qualified medical doctors, scientific researchers and mathematicians arguing a connection, though sometimes different forms of a connection. (We will come to specific names and perspectives below). Certainly their conclusions can be debated, but the information below will show that they cannot so easily be dismissed. Especially when we step away from more ridiculous stories about radio waves having some kind of magical power to spread viruses, and get to more reasoned arguments.

The Apparent Correlation: A superficial look suggests there may be a correlation: In late 2019 / early 2020, one of the biggest biggest implementations of 5G technology in the world was Wuhan, China. The cruise ships Diamond Princess and Ruby Princess, both hit early in the outbreak, were both floating showcases of 5G technology. And northern Italy, Madrid, and New York, all major hotspots of coronavirus fatality, all had major implementations of 5G. In fact, taking a slightly more systematic look, with such data as is available, tends to reinforce that view:

APPROXIMATE LOCATIONS OF SUBSTANTIAL 5G INSTALLATIONS AROUND THE WORLD



approx. locations as given on worldtimezone.com



approx. locations adjusted to reflect analysis of media and industry data on installations

This third map shows where the highest levels of Covid-19 deaths (by a factor of around 25, as compared to the areas with no grey patches) were occurring during the first wave of the pandemic. While much is made of a 'global pandemic, present in more than 200 territories', the fact is that significant numbers of deaths have occurred only in about a dozen countries. Note here that the distributions of grey patches for China and USA cannot be determined with any certainty, but is intended to reflect that there are high levels of deaths across various parts of the country. For Europe, the grey patches represent more precisely that the countries with high levels of deaths, as a percentage of population, are Belgium, Holland, France, Ireland, Italy, Spain, Sweden, Switzerland and UK.



REPORTED COVID-19 DEATHS IN RELATION TO 5G INSTALLATIONS

The table below shows the reported deaths (taken as a snapshot at 20/4/2020) for 100 countries and territories, as a percentage of total population. The countries and territories were chosen to include all of the G20 nations, all of the 'Asian Tigers', all of Europe except a handful of very small nations such as Luxembourg, Estonia and Macedonia, most of the bigger countries from both South America and Africa, and a handful each from Central America, Central Asia and the Middle East. Further information on the data, criteria for determining level of 5G etc, are given overleaf, and in the Appendices.

NO 5G INSTALLATIONS		MINIMAL 5G INSTALLATIONS		SIGNIFICANT 5G INSTALLATIONS		EXTENSIVE 5G INSTALLATIONS	
country	% dead	country	% dead	country	% dead	country	% dead
CHILE	0.000697	PORTUGAL	0.007204	BELGIUM	0.054377	SPAIN	0.046741
BELARUS	0.000540	IRAN	0.006345	NETHERLANDS	0.021527	ITALY	0.039234
HONDURAS	0.000466	DENMARK	0.006289	SWEDEN	0.015665	FRANCE	0.030453
COLUMBIA	0.000353	GERMANY	0.005594	U.S.A.	0.012488	U.K.	0.023779
BOLIVIA	0.000300	AUSTRIA	0.005024	PHILLIPINES	0.000392	CHINA	0.021402
LATVIA	0.000265	CANADA	0.004205	SAUDI ARABIA	0.000297	SWITZERLAND	0.016270
CUBA	0.000247	SLOVENIA	0.003560			IRELAND	0.013945
INDONESIA	0.000216	ICELAND	0.002746			SOUTH KOREA	0.000460
IRAQ	0.000205	ECUADOR	0.002695			U.A.E.	0.000334
PARAGUAY	0.000112	TURKEY	0.002521				
MALI	0.000070	PUERTO RICO	0.002157				
SOMALIA	0.000044	NORWAY	0.002088				
GAMBIA	0.000044	HUNGARY	0.002059				
INDIA	0.000041	ISRAEL	0.002005				
AFGHANISTAN	0.000033	CZECH	0.001793				
VENEZUALA	0.000032	BOSNIA	0.001494				
GHANA	0.000029	LITHUANIA	0.001355				
ASSAM	0.000028	PERU	0.001217				
SUDAN	0.000027	ALASKA	0.001172				
SYRIA	0.000023	BRAZIL	0.001170				
MAURITANIA	0.000022	CROATIA	0.001144				
TANZANIA	0.000017	GREECE	0.000891				
ZAMBIA	0.000016	FINLAND	0.000885				
NICARAGUA	0.000015	ROMANIA	0.000784				
LIBYA	0.000015	BULGARIA	0.000618				
ANGOLA	0.000006	MEXICO	0.000533				
ETHIOPIA	0.000003	POLAND	0.000478				
GREENLAND	0.000000	BAHRAIN	0.000414				
FR. GUIANA	0.000000	URUGUAY	0.000403				
BHUTAN	0.000000	MOROCCO	0.000388				
NAMIBIA	0.000000	UKRAINE	0.000345				
MONGOLIA	0.000000	ARGENTINA	0.000297				
CHAD	0.000000	AUSTRALIA	0.000279				
NEPAL	0.000000	RUSSIA	0.000278				
YEMEN	0.000000	N. ZEALAND	0.000249				
		EGYPT	0.000245				
		SINGAPORE	0.000188				
		JAPAN	0.000188				
		OMAN	0.000138				
		KAZAKHSTAN	0.000101				
		THAILAND	0.000067				
		BANGLADESH	0.000061				
		SOUTH AFRICA	0.000046				
		KENYA	0.000028				
		TAIWAN	0.000025				
		NIGERIA	0.000011				
		MYANMAR	0.000009				
		PAKISTAN	0.000003				
		LAOS	0.000000				
		VIETNAM	0.000000				

Some Comments on the Data: This analysis is based on numbers of deaths, not numbers of infections. Measuring the number of infections is impossible since such large numbers of people are apparently infected with no symptoms, and not identified. Yet even when data based on wider testing is available, it will still be deaths which are more relevant in the present context. If a virus is present in large numbers of people, but killing some because of some kind of relationship to 5G (several kinds or relationship have been put forward by doctors and researchers and are described further below), then deaths, not infections, would be the relevant measure. Or perhaps 'serious cases' – though deaths seems to be a reasonable proxy for that.

There are of course uncertainties. Deaths are counted and attributed differently in different places, and some authorities lie about the the level of deaths in their countries. And in fact the 'complicating factors' are almost infinite: different levels of health care, different social habits, different technical types of 5G with different frequencies would be only the beginning. (See 'Can We Ever Have a Definitive Analysis?', below). Yet the available counts, wherever they are taken from, serve as a reasonable guideline. We can say with some confidence for instance that the deaths in Spain and Italy and UK and USA are in the tens of thousands, that in Portugal and Germany and Iran they are very much lower, and that in India, Australia, Greece and continent of Africa they are close to zero. And the correlation simply with 5G (rather than different kinds of 5G) is clear and significant. In fact, even allowing for certain anomalies, such as South Korea, Saudi Arabia and U.A.E., where 5G levels are high and death rates are low, the average of death rates for all countries which have 'extensive or significant' levels of 5G is 25.13 times higher than that for countries which have 'minimal or no' 5G. That would seem significant notwithstanding some variations in approaches to counting and reporting. Regarding the anomalies in the Middle East, we can note what appears to be emerging as a scientific consensus, that the virus does not flourish in direct sun. If true, then the only real anomaly in the data would be South Korea.

And a note on China: It seems well established that the real number of deaths there was higher than the Chinese Communist Party would admit to. Therefore in the data as presented here, a probably conservative estimate has been made for China based on the average of the eight other countries with 'extensive' 5G (including the 'anomalies' of Saudi, South Korea and UAE, with their very low death rates).

Correlation is not Causation: When two things follow a similar pattern it might be because one caused the other, or it might not. So it is necessary to consider what other common factors might be at work. Maybe it's because the countries with more deaths are all highly developed modern countries, therefore being the first to install 5G - and at the same time having other factors affecting immunity and health: such as stress, diabetes, obesity and older population. Or maybe the real cause of the variation is that it is worse where pollution is worse. In fact, most of the obvious possibilities are easily dismissed: Israel, Canada, Norway, Japan, Germany and Singapore are very modern nations with very low death rates. China and Northern Italy and Paris are polluted places with high death rates, but Sweden and Switzerland are clean places with high death rates. And Sao Paulo, India and Mexico are polluted places with very low death rates. There are countries with relatively better health care which have high death rates (UK, Spain, USA, Sweden) and countries with relatively worse health care which have low death rates (Mexico, Somalia, Ethiopia, Honduras). So maybe it's the measures taken by different countries, and how early they took them? Greece, Portugal and Taiwan have all been praised as models of countries which took measures early and 'drove the death rate down'. But notably they are also countries with no 5G.

It is relevant here to look at Sweden, a country which took only moderate measures, such as closing old-people's homes to visitors, closing universities but not children's schools, keeping businesses and restaurants open, and not 'locking down'. When former state epidemiologist for Sweden, Prof. Johan Giesecke, defended this policy, an interviewer on British TV¹ put the question to him "how is that working out compared to your Scandinavian

neighbours”)? The question was clearly intended to highlight the fact that Sweden's death rate was at the time considerable higher than all those of Denmark, Norway and Finland. Giesecke said he believed that said that lock-downs merely defer some of the deaths, and that a year on it would be apparent that what measures different countries took and when, would have made no difference to the ultimate number of deaths². Maybe time will prove that the type and timing of measures *did* make a difference – but if we're really interesting in observing all the facts, let's at least notice the striking co-incidence that almost all of the countries which got good results with their 'measures' are the the ones with no 5G. Let's at least notice that Sweden with its relatively high death rates has significant levels of 5G, and that all of its 'Scandinavian neighbours' have minimal levels. Let's notice that the interviewer's own UK, as well as France, Ireland, Switzerland, Spain and Italy, were all in lock-down and all had very much higher death rates than Sweden - as well as higher levels of 5G installation. Let's at least notice that where the virus seemed reluctant to cross borders (or at least reluctant to kill very many having done so) there was, in almost every case, significant levels of 5G on one side of the border, and little or none on the other. That was the case for the borders between Sweden and Norway/Denmark/Finland, between Spain and Portugal, between the USA and Canada/Mexico, between France and Germany, between Switzerland and Germany, between Switzerland and Austria, between Italy and Austria, and between Italy and Slovenia.

The only other common factor I have been able to identify (though of course others may exist), is climate. Saudi Arabia and U.A.E. have already been noted above. But in fact the death toll is very close to zero for the entire southern hemisphere. So hot, sunny weather seems quite likely to be a factor, and many medical experts are saying so. But even then, one would still have to note that the level of 5G installation in the southern hemisphere is close to zero, and that in the northern hemisphere, the deaths still congregate where the 5G is.

Deeper Into the Arguments: There are three slightly different arguments being made – but they all start from the same place, and that is 'cell toxicity'. Certain electro-magnetic frequencies, the shared part of the argument has it, 'poison' biological cells. That much of the argument, relating specifically to 5G, is supported by, for instance, Thomas Cowan MD, Andrew Kaufman MD, and former army surgeon Rashid Buttar, DO, FAAPM, FACAM, FAAIM, by neuroscientist and dermatologist Prof. Olle Johansson, and by Gary Kohn MD. And by professor of biochemistry Martin Pall, who said that “Putting in tens of millions of 5G antennae without a single biological test of safety has got to be about the stupidest idea anyone has had in the history of the world.” (We'll come to the question of safety tests below). After the starting point of 'cell toxicity', there are some variations to the argument: Cowan focused more on the assertion (with its origins in alternative medicine) that when cells are poisoned, they eject matter from within themselves, and that sometimes includes corrupted fragments of RNA – a virus. Or in other words, that viruses in in other words, are 'born' of cell toxicity. Kaufman focused more on the suggestion that these fragments of corrupted RNA are simply that – not a virus, but fragments of RNA which are identified in (flawed) tests as a virus, but are actually a symptom of a sickness, not a cause of one. Buttar more explicitly stated that 5G weakens the immune system. However, they all start from cell toxicity, and they all touch upon the emerging field of research on exosomes (these being the things which are expelled from cells as part of the regulation process). And then there is increasingly emerging evidence that Covid-19 sickness is not like a flu but involves inflammation, oxygen loss, cardiac dysfunction, including cardiac arrest, inflammation, thrombosis, as well as symptoms having more in common with radiation sickness and altitude sickness than with flu or pneumonia. There are countless testimonies from doctors one could draw upon here, but I will limit myself to two, both of them working on the front line. Buttar said “why are these people presenting to the hospitals, showing atypical, unusual, never-before seen types of symptoms, having hypoxia, meaning low oxygen levels, like altitude sickness, like radiation sickness, why are they having these strange phenomena”? And when Cameron Kyle-Sidell, a critical-care doctor in New York, set up an intensive care unit to look after that city's worst Covid cases, he was expecting to treat ARDS (acute respiratory distress syndrome) and was disturbed by what he saw instead: Though not linking it to 5G, he said “everything I have seen [in the course of that

work] has led me to believe that Covid-19 is not that disease [ARDS].... Rather it appears to be some kind of viral-induced disease most resembling high-altitude sickness... this is a disease that is different than anything we have ever seen". In the light of all this, irrespective of who is right or wrong and in what degree, we shouldn't pretend that this 'dangerous nonsense' has its origin in wild-eyed conspiracy theorists and Russian trolls. And especially we shouldn't pretend that when, as we will see below, the politicians and 'journalists' who would like to dismiss it that way, most certainly have less ground to stand on than the 'crazy people' they wish to denounce.

In 2017, scientist and mathematician Arthur Firstenberg published 500 pages of research under the title 'The Invisible Rainbow' – that being a reference to the electro-magnetic spectrum. Chellis Glendenning described him as “a pioneer in the sense that Rachel Carson was pioneer”. Firstenberg's work was mostly focused on correlations between electro-magnetic fields and a great many health problems including heart disease, diabetes, falling sperm counts and falling fertility. But along the way he also noted that every major wave of electrification of the earth has coincided with some kind of pandemic. When power lines began to be erected at the end of the 19th century, the Russian Flu (1889-1890) erupted and spread through Russia, Europe and the Eastern USA, killing around a million. When radio was widely implemented in World War One, the 'Spanish Flu' erupted, not in Spain, but in the USA and in the trenches of the war itself. It killed between 50 and 100 million in Asia, Europe, North and South America, Australia and Africa. (Firstenberg didn't mention it, but polio, known to exist since ancient Egypt, in fact also began to spread in Europe and the USA from around the time of World War One). Radar was developed through the '30s and '40s, but was intensified with the widespread implementation of pulsed-doppler radar for meteorology, astronomy, air-traffic control and shipping through the '50s, culminating in the ultra-large dish installations such as the one 250 feet wide installed at Jodrell Bank in 1957 – the same year that the Asian Flu broke out, taking two million lives worldwide. When radio frequency communications satellites were put into orbit through the late 1960's, we had the Hong Kong flu, erupting in 1968 and claiming a million lives as it spread - first through Hong Kong, India, the Philippines, northern Australia, and Europe, and later through the United States, Japan, Africa, and South America. Firstenberg also referred to a major collapse of bee populations which occurred around 2006 – 2007, the same period that the HAARP installation in Alaska was completed. (Bee populations have long been subject to cyclical and unexplained collapses, but suffered an especially big one at that time). All this comes with the suggestion that our biology adapts to the newly introduced frequencies, but each time with a lowered level of vitality.

When connections are made between electro-magnetic radiation and health problems, one can often hear “oh that again, people have been saying that since radio”! Firstenberg's answer: Yes, and it's been causing problems since radio. And now, retrospectively, we can add to his list of coincidences the roll out of 5G and the eruption of Covid-19. At the time of writing, it had reportedly killed around a quarter of a million.

A Relevant Digression: Covid-19 and 5G are subject to other possible linkages too. Whether or not the disease is caused, or worsened, by the technology, it is most certainly being used to push the agenda for the further roll-out of the technology. We need (apparently) more speed, more coverage, more accurate tracking of people. While that is likely neither necessary nor effective, it is pushed as if it were humanity's only hope. (Against a disease which during the first three months of 2020 killed far less people globally than are killed in a three month period in car accidents).

On the 15th April 2020, The Financial Times³ ran a story saying that 60 communications masts had been set on fire in the UK, two towers had been vandalised in Ireland, one had been attacked by 18 people in Cyprus, and there had been 11 attempts in the Netherlands. But this public agnst about 5G was in fact not only about biological health concerns. It was also about social health concerns: oppression and authoritarianism. In China, in 2018/2019, 'social credit scoring', piloted from some years previously, was consolidated and extended. Social credit scoring compels obedience by punishing non-conformist citizens (who jay-walk, criticise the government, hold the wrong political opinions, visit the

wrong web-sites, blow the whistle on potential pandemics, etc) with slow internet access, travel restrictions, lesser access to public facilities, and worse. In 2018 / 2019, it was being substantially underpinned by China's world-leading roll-out of 5G internet / telecom technology, with face recognition cameras everywhere, even on drones flying in the streets. In 2019 American Brigadier General Robert S. Spalding elucidated well⁴ what this implies. He said in an interview that Huawei were provided with millions of dollars to ensure that China led the world in 5G, and worked in close collaboration with Baidu, Alibaba, and Tencent. (The Chinese equivalents of Facebook, Amazon, and Google). China already by that time, he said, had around two hundred million face recognition cameras on the streets. And would have one camera for every two people by 2022. (That's close to three quarters of a billion cameras). By that point, he said, no mobile phone is needed. You will be able to walk out of your house and say 'Uber', and a camera and a microphone will pick you up and send a car. When the car comes, another camera mounted on it will recognise you, and pull up records of your common destinations. It was difficult to opt out of smart phone use. It's impossible to opt out of this system. The darker implications hardly need mentioning. Are we to believe nothing similar is coming to the West? Indeed face recognition is already being implemented in London, and The New Economics Foundation, a think-tank based in London, has suggested that credit scores are already being used to filter job applications, determine access to social services, and more in the UK. American business magazine Fast Company suggested that social privileges are already being determined in the U.S. by technology companies. Many other countries also have developments in the same direction.

In April 2020, NSA whistle-blower Edward Snowden was interviewed for his thoughts on the global 'shelter in place' strategy.⁵ The interviewer brought up both sweeping powers being given to governments and the question of tracking people via their mobile phones, and suggested that "basically, your smart phone is your new ankle bracelet". Snowden's response was to say, first, that contact tracing can work with one infection, or a hundred infections but for a 100,000 "quickly becomes useless". Second, he noted that it is an error to believe that such tracking can be anonymous: location information accurate enough to mean anything cannot possibly be anonymous. Third, he noted that "sadly, these emergency powers that are born out of crisis have a perfect history of abuse.... the emergency never ends, it becomes normalised". And most tellingly he declared that "what is being built is the architecture of oppression". Sobering, from a man of his background.

The Suppression of Debate and Information: With all the uncertainties (the various mutations of the virus, the various types of 5G technology, the real numbers of deaths, and all the other factors at work in various countries), one of the few things we can be certain of is that when what is at stake is a trillion dollar industry, and a potential for massive political control, truth will not be given free reign. Censorship is certainly at work. Dr John Bergman put up a video about the importance of immune health, the use of vitamin c, vitamin d3 and zinc to support it, and the need for caution about attempts to terrify and control everybody. His video (<https://youtu.be/SdWuQfiDpDI>) was removed by Youtube. Dr Thomas Cowan MD put up a video speaking both about strengthening immune health, and the possibility of immune health being compromised by 5G. His video (<https://www.youtube.com/watch?v=zFN5LUaqxOA>) was removed by YouTube. Dr. Rashid Buttar had several videos, relating both to his wish to emphasise understanding of immune health over magic-bullets, and his belief that 5G compromises immune health, removed from Youtube and Facebook. (Knowing that censorship was in progress, I transcribed some of those, and others, before they were deleted). Surely these are people qualified to express an opinion? Yet governments and media organisations everywhere were expressly and resolutely saying no to any questioning, any debate. Facebook and YouTube announced decisions that they would remove any material from their platforms which mention such a link, or the possibility of one. WhatsApp announced a new policy to limit the number of recipients a message could be forwarded to. (This was not declared to be related to the 5G story, but the timing coincided). Some media sources meanwhile, ridiculed claims of any link between 5G and coronavirus in terms which were themselves ridiculous. Talk Radio host Mike Graham responded to a guest on his show⁶ referring disparagingly to people "claiming that 5G masts

are spreading coronavirus” by saying “yes, there's a one fact denial of that story, right, because there's only apparently five countries in the world that have 5G masts, so if that was actually true, then coronavirus would only be in five countries”. Why is a supposed journalist making such adamant statements when he apparently doesn't know at all what 5G is installed where, nor even what argument it is that is being made? Bob Beschiza, of the long-running American magazine turned blog 'Boing Boing',⁷ reported that masts were being burned down in Britain because of people's ridiculous beliefs that “radio waves, especially at frequencies used by 5G might carry the virus”. At times, it seemed that people in the media were wilfully misinterpreting the nature of the 5G / coronavirus argument so as to make it easier to knock it down. Meanwhile "fact checkers" appeared on the scene, but as usual it was not clear who was checking the fact checkers, and who was paying the fact checkers. A fact checker who removes information, or gives advice leading to the removal of information, is just a censor.

There are reasonable grounds then, for exploring a possible link between 5G and coronavirus. But are there any grounds for dismissing it as a deranged and dangerous idea, and for censoring those who speak of it? When UK Minister Michael Gove announces that it is 'dangerous nonsense', when the European Commission publishes a message saying “there is no link between 5G deployment and the outbreak of coronavirus” and “Misinformation online can spread confusion and fear”, when the Financial Times assure us that “the International Commission on Non-Ionizing Radiation Protection had found that there was no risk to human health from 5G signals”, what do all these assertions rest upon? The International Commission on Non-Ionizing Radiation Protection is a self-appointed NGO described by Jean Huss from the EU Committee on the Environment, Agriculture and Local and Regional Affairs as “an NGO whose origin and structure are none too clear and which is furthermore suspected of having rather close links with the industries”⁸. Even then, in their revision to guidelines in March 2020, which was the most cited source for those who assure us all is well, the ICNIRP itself said that prior to that time it's guidelines had been “conservative in most cases”.⁹ And a television presenter in the UK who committed the crime of saying on air that those issuing such denials maybe shouldn't be so categorical “when they don't know that its not true”, he was subjected to an investigation by the country's 'communications regulator' (Ofcom).¹⁰

It was however, perfectly reasonable to say “they don't know that its not true”: Not only do politicians and media presenters fail to back up their claims that 5G is proven harmless with meaningful references, but a 2019 US Senate hearing¹¹ had already revealed a clear lack of adequate safety studies. During that hearing, Senator Richard Blumenthal put questions to Brad Gillen, CEO of the Cellular Telecoms Industry Association, and another representative of that organisation, identified as Mr. Berry. Here are some parts of the dialogue: *Blumenthal*: 5G, as you well know, uses much higher frequencies which don't travel as far and will rely on a network of hundreds of thousands, potentially millions, of small cell sites, and the question then is, are there any health implications, any public safety implications to those additional sites that are likely to be located close to houses, schools and work-places. And closer to the ground, correct? *Gillen*: Correct Senator, yes. *Blumenthal*: So in December 2018, I sent a letter to FCC [Federal Communications Commission] commissioner Carr asking him to cite for me recent scientific studies demonstrating the safety of this technology, what research has been done, where has it been published and compiled. He has failed to do so, and just echoes the general statements of the FDA [Food and Drug Administration] which share regulatory responsibility for cell phones with the FCC. If you go to the FDA website; pretty unsatisfactory. There is basically a cursory and superficial citation to existing scientific data, saying, quote, “The FDA has urged the cell phone industry to take a number of steps, including 'support additional research on possible biological effects of radio-frequency fields for the type of signals emitted by cell phones'. *Blumenthal*: How much money has the industry committed to supporting additional independent research? Is that independent research ongoing, has any been completed, where can consumers look for it? *Gillen*: There are no industry-backed studies to my knowledge. *Blumenthal*: Anybody else know of industry commitments to back research, fund it, support it, to ascertain scientifically the health effects? *Berry*: Senator, I'm not aware either, but I do know that with small cells

especially, you're going to have lower power levels. And of course from a carrier perspective, you want to be able to manage interference so that the interference is the lowest interference possible. So I would think that some of those studies or some of that information could be utilised in looking at health consequences. But no, I'm not aware of any.

Can We Ever Have a Definitive Analysis? It seems unlikely any time soon. Even when better data is available on the numbers of deaths, more precise locations of deaths, different kinds of 5G installed in different places etc, and it is analysed by scientists and statisticians, those people will certainly continue to disagree. The number of 'other factors' is almost infinite – pollution levels, type and timing of measures taken, climatic conditions, mutations and variations of the virus in different places, different social habits, places with older populations, different densities of population, proximity of deaths within a country to actual 5G installations, different levels of available health-care, different treatment strategies. The list goes on and on. And in such circumstance scientists rarely come to agree. Or sometimes, like with the health damage caused by smoking, they eventually do come to agree, but it takes a very long time. And we cannot afford to wait a very long time. It is already clear that sufficient evidence of on the safety of 5G does *not* exist. It is perfectly clear that when ten, eleven, twelve figure sums of money, plus enormous potential for political control are involved, truth is suppressed, distorted and denied. There is in fact already good scientific research on the harmful effects of certain kinds of EMF, going back to the 1980's (Robert Becker, Roger Coghill, Devra Davis, Arthur Firstenberg, and Dimitris Panagopoulos and are but a handful of the relevant names). Even the attacks on masts are not new, and not specific only to 5G. In 2007 an Australian man stole a restored army tank and drove it along Sydney streets causing 5 million dollars worth of damage as he tore out a number of cell phone masts.¹² (Unsurprisingly, he went to prison for it). The evidence of health dangers is extensive. In fact there is a database at <https://onedrive.live.com/view.aspx?resid=1B7E081938537321199&ithint=file%2cxlsx&authkey=!ANqUqfympZAWv4o> containing well in excess of a thousand research papers indicating health damage from mobile phones and other electro-magnetic fields. 5G is likely to be a 'step change' in the developments of 'environmental EMF', rather than a part of gradual, linear evolution. But how will research get the oxygen it needs, and how will it not get distorted, when so much money and power is at stake?

What Comes Next? This brief analysis was written at a time somewhere close to the end of 'the first wave'. There may or may not be other waves. The categorisation of 'extensive' for the 5G implementations in countries like USA, Spain, Italy or UK are relative – a great deal more 5G rollout is planned. Countries which presently have 'little or none' will begin to implement. Winter is coming for the Southern hemisphere. Will the disease spread in southern hemisphere countries even where there is no 5G, as the weather gets colder? (We'll see, but even if it does, it will not change the significance of the way it started). Irrespective what comes next with the virus, expect a second and third wave of insistence on tracking people. And also expect a continued growth in the the campaigns against 5G. There are 'stop 5G' campaigns all over the world, and they have been active, and even getting some results, for at least a couple of years already. In **2018**: numerous town councils in Italy proposed a cessation of 5G implementation, and some of them have acted on it.¹³ In the same year, a city in California (Mill Valley) banned 5G.^{14, 15} In **2019**: Belgium announced a halt to further 5G developments in Brussels.^{16,17,18} A petition with 50,000 signatures obliged 5G safety to be discussed in parliament in Germany.¹⁹ In the USA an organisation called Physicians for Safe Technology began campaigning for a moratorium²⁰, and a broad range of doctors, scientists and health-care workers sent a petition to President Trump demanding a moratorium.²¹ And the following have all occurred in **2020**: Nearly 2000 astronomers signed an international petition against 50,000 new 5G satellites going into orbit²² Finland announced a moratorium on 5G implementation.^{23,24} Switzerland announced a moratorium on 5G implementation.^{25,26,27} Two French NGOs filed a legal action to stop 5G roll-out in that country.^{28,29} Slovenia put a stop on 5G implementation.^{30,31,32} And if all those actions succumb later to financial and political pressure, it will not mean the issue has gone away. Meanwhile, it would be fair to wonder why you have so little about all this from your favourite news channels.

The official denials do not signify the end of anything. Despite the persistent and unsubstantiated cries of 'dangerous nonsense' from governments and a controlled media, the battle for truth is just warming up, and can be expected to go on for some time.

The Bottom Line Does all this prove that people are dying because of, or partly because of, 5G? NO. Does it prove that there is intent to use 5G technology for political oppression and authoritarianism? NO. Does it prove that there is a case to be answered? YES. Should we be concerned about the rapid growth of direct censorship and suppression of debate? EXTREMELY. And do we really need our fridges, our washing machines, our electricity meters, lamp-posts and cameras in the street, et al, connected to the internet anyway? WELL, PROBABLY NOT.

If you feel that there is cause for concern here, there are some things you might do. Read some of the literature cited in this brief analysis. Write to your political representatives. Be part of the 'lack of demand'. (Mobile companies in South Korea and Ireland have already delayed some of their further roll-out plans, citing lack of take-up). Or go back to an old 'dumb-phone' and put a fixed line in your house for the computer. Forward this paper to others you think may be interested. Make yourself aware of the activities of campaign groups. Above all, stop believing that your governments or your daily news channels are giving you anything even vaguely resembling the truth, and start digging for other sources. Unless you are already convinced that the truth is clear, become part of the battle for it to be made clear. Because a very great deal is at stake.

The 'crisis of 2020', a health crisis, and an economic crisis and a political crisis, adding up to a human crisis which is more serious than the sum of its parts, represents both dangers and opportunities far beyond those discussed in this paper. Those I will take up in another paper, coming soon.

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Appendix A: Data Used

Numbers of reported deaths were taken at a point in time, being 20th April 2020. At that time, reported infections and deaths were slowing substantially in most places, suggesting that the 'first wave' was coming toward and end. The level of presence of 5G in each country was found by searching on media reports, industry announcements, 5G tracking websites (such as NPERF and OOKLA), such other sources as could be found on the internet, and where possible cross-verifying those sources. Sources are listed in Appendix B. The countries were categorised according to the following criteria:

- **No 5G** (searches showed no evidence of live or test 5G installations)
- **Minimal 5G** (searches showed small scale or localised testing and / or live services).
- **Significant 5G** (searches showed active testing networks across multiple locations and / or live installation in a small number of locations or with limited coverage).
- **Extensive 5G** (searches showed live services with significant coverage to be extended across the nation before the end of 2019).

COUNTRY	DEATHS	POP'N	% DEAD	5G PRESENCE
AFGHANISTAN	33	100,000,000	0.000033	NONE KNOWN
ALASKA	9	768,146	0.001172	April 2020 GCI turns on sites in Anchorage. MINIMAL
ANGOLA	2	32,653,202	0.000006	NONE KNOWN
ARGENTINA	134	45,115,757	0.000297	Nov 2017 Movistar/Ericsson conduct tests. MINIMAL
ASSAM	1	3,556,608	0.000028	NONE KNOWN
AUSTRALIA	71	25,438,356	0.000279	May 2019 Data from Australian Mobile Telecom Association indicates 488 locations 'active or proposed' for 5G masts, as preparation for 2020 rollout. July 2019 UK's Guardian newspaper reports that in Australia patches of 5G are available in some areas but "it won't be until at least 2020 that 5G has any real impact, and several more years until the networks are completed". In a vast country like Australia this must be seen as minimal. MINIMAL
AUSTRIA	452	8,996,583	0.005024	March 2019 T-Mobile establishes 25 base stations in rural areas. August 2019 Magenta Telekom performs first 5G test. January 2019 A1 Telekom Austria recently tests first live data connection in Gmünd. MINIMAL
BANGLADESH	101	164,367,615	0.000061	2018 Huawei conduct demo. MINIMAL
BAHRAIN	7	1,689,116	0.000414	Late March 2020 STC Bahrain reportedly providing coverage to half the population. Timing is late for the purpose of this study, hence MINIMAL
BELARUS	51	9,449,915	0.000540	NONE KNOWN
BELGIUM	6,262	11,515,793	0.054377	June 2016 Offers up spectrum for trials. November 2016, Proximus 5G press conference announces they have tested 5G in Belgium. June 2017 Telenet and Chinese ZTE announce collaboration to upgrade Belgian 4G networks for 5G. November 2017 Ericsson and Corda set up 5G testing facility at Hasselt. September 2018 Orange/Nokia test in Liege. December 2019 Orange announces 5G hub in Antwerp. SIGNIFICANT
BHUTAN	0	769,937	0.000000	NONE KNOWN
BOLIVIA	35	11,673,021	0.000300	NONE KNOWN
BOSNIA	49	3,280,819	0.001494	NONE KNOWN
BRAZIL	2,484	212,244,906	0.001170	2018 Claro installs a single tower at Ilha do Fundão for testing, and uses 5g at a music concert in Sao Paulo. MINIMAL
BULGARIA	43	6,958,059	0.000618	July 2019 Telenor starts trials. MINIMAL
CANADA	1,587	37,742,154	0.004205	July 2019: First pre-commercial testbed. March 2020 first commercial services in downtown areas of Montreal, Ottawa, Toronto and Vancouver. MINIMAL
CHAD	0	16,329,612	0.000000	NONE KNOWN
CHILE	133	19,084,596	0.000697	NONE KNOWN
CHINA	?	1,439,323,776	0.019070	December 2017 China Telecom pilots 5 base stations in Lanzhou, additional to earlier pilots in Xiong'an, Shenzhen, Shanghai, Suzhou, Chengdu. June 18 China Unicom pilots in 16 cities. May 2019 a Chinese news service announces that Hubei province has set up 300 5G base stations "and achieved full 5G signal coverage in its prefecture-level cities". November 2019 China Mobile, China Telecom and China Unicom have services live in 50 cities, including Beijing, Shanghai, Guangzhou and Shenzhen. By the end of 2019 China Telecom has 40,000 base station nationwide, China Unicom has 20,000 base stations nationwide. EXTENSIVE
COLUMBIA	179	50,774,840	0.000353	NONE KNOWN
CROATIA	47	4,109,938	0.001144	July 2018 Croatia Telecom (Hrvatski) conduct demo. March 2019 Croatia Telecom (Hrvatski) launch pilots in Samobor, Osijek and the island of Krk. MINIMAL
CUBA	28	11,327,931	0.000247	NONE KNOWN
CZECH	192	10,708,981	0.001793	NONE KNOWN

DENMARK	364	5,788,219	0.006289	May 2018 TDC with Huawei begin testing. March 2019 TDC Net announces collaboration with Ericsson for 5G. December 2019 TDC Net/Ericsson launches pilot in Helsingor. MINIMAL
ECUADOR	474	17,586,794	0.002695	June 2019 Huawei commences tests in Ecuador. September 2019 Claro Ecuador has commences tests in Guayaquil. MINIMAL
EGYPT	250	101,940,839	0.000245	December 2017, first tests. Feb 2019 Telecom Egypt and Ericsson announce the upgrade of Telecom Egypt's Cloud Core Network to be 5G ready. MINIMAL
ETHIOPIA	3	112,759,000	0.000003	NONE KNOWN
FINLAND	49	5,539,119	0.000885	2015 University of Oulu, with Nokia, creates first testbed. June 2018 Ålcom/Ericsson conducted tests in Mariehamn. June 2018 Elisa / Huawei establishes a network, pending license to operate in Tampere. Public concerns, petitions to government and suspensions of funding have delayed further progress. MINIMAL
FR. GUIANA	0	297,114	0.000000	NONE KNOWN
FRANCE	19718	64,750,000	0.030453	5G infrastructure installed and active for testing in Paris, Nantes, Lille, Montpellier, Marseilles, Douai, Chatillon, Linas-Monthery. November 2015 Millimetre wave testing in France conducted by Orange. Feb 2018 Orange announces 'First technical end-to-end 5G test in France in Lille and Douai' July 2018 Orange announces extension of testing to Paris, Châtillon and Linas-Monthéry, plus a demonstration platform 'as close to reality as possible' in the Opera area of Paris by 2019. October 2018 first live tests in France, partnership of Orange / Ericsson Feb 2020 Huawei factory in France announced. EXTENSIVE
GAMBIA	1	2,293,000	0.000044	NONE KNOWN
GERMANY	4,684	83,729,493	0.005594	December 2018 Telefonica Germany and Nokia begin testing in Berlin. March 2019. Deutsche Telecom announces it will have 300 masts installed in 6 German cities by the end of 2019. July 2019 Deutsche Telecom launches limited coverage in Berlin and Bonn. MINIMAL
GHANA	9	30,943,478	0.000029	NONE KNOWN
GREECE	93	10,432,345	0.000891	December 2018 Cosmote launches first trial. MINIMAL
GREENLAND	0	56,770	0.000000	NONE KNOWN
HONDURAS	46	9,873,615	0.000466	NONE KNOWN
HUNGARY	199	9,665,259	0.002059	May 2019 Telekom conducts tests in Zalaegerszeg and Kecskemét. November 2019 Digi conducts tests in Budapest. MINIMAL
ICELAND	10	364,134	0.002746	Feb 2019 Nova erects a tower in Reykjavik for testing. MINIMAL
INDIA	567	1,380,004,385	0.000041	Reports say testing will start late 2020. MINIMAL
INDONESIA	590	273,010,691	0.000216	NONE KNOWN
IRAN	5,301	83,542,000	0.006345	Began testing 2016. May 2017 IranCell signs deal for Ericsson support in developing network. Sept 2017 announces that it has tested its network (size / location not clear). MINIMAL
IRAQ	82	40,039,042	0.000205	NONE KNOWN
IRELAND	687	4,926,329	0.013945	2016 government announces auction for 5G frequencies and invites applications. November 2018 Vodafone launches test site in Dublin. August 2019 Vodafone goes live in Dublin, Cork, Limerick, Galway and Waterford. October . October 2019 EIR/Ericsson launches live network across the country. November 2019 Three Mobile postpones launch, saying there is no demand. EXTENSIVE
ISRAEL	173	8,627,074	0.002005	NONE KNOWN
ITALY	23,708	60,427,000	0.039234	5G live in Milan, Turin, Bologna, Rome, Naples. Milan significantly heaviest coverage. March 2017. Trials start in Milan, Prato, L'Aquila, Bari and Matera. June 2019 Vodafone 5G goes live in Milan, Turin, Bologna, Rome, and Naples. July 2019 TIM/Ericsson live in Rome, Turin, Naples. EXTENSIVE
JAPAN	238	126,553,818	0.000188	November 2017 5G tested from moving cars. December 2017 Samsung tests onboard Japanese high-speed trains. March 2020 companies which were planning to launch for the July 2020 olympics delay due disruptions of coronavirus. MINIMAL
KAZAKHSTAN	19	18,733,636	0.000101	October 2019 Veon launches trials. Beeline provides live service in Shymkent. MINIMAL
KENYA	15	53,534,091	0.000028	Some reports of minimal testing. MINIMAL
LAOS	0	7,254,296	0.000000	November 2019 Unitel conducts test in Vientiane. MINIMAL
LATVIA	5	1,889,935	0.000265	NONE KNOWN
LIBYA	1	6,852,776	0.000015	NONE KNOWN
LITHUANIA	37	2,729,965	0.001355	December 2018 Telia launches trial network. MINIMAL
MALI	14	20,130,082	0.000070	NONE KNOWN
MAURITANIA	1	4,624,876	0.000022	NONE KNOWN
MEXICO	686	128,662,987	0.000533	September 2019. Report says 3 operators will start to deploy 'in coming months'. MINIMAL
MONGOLIA	0	3,268,042	0.000000	NONE KNOWN
MOROCCO	143	36,826,688	0.000388	March 2019 Ericsson conducts tests. April 2019 Inwi launches pre-commercial tests. MINIMAL
MYANMAR	5	54,339,928	0.000009	July and August 2019 some testing. MINIMAL
NEW ZEALAND	12	4,814,806	0.000249	March 2018 Spark begins tests. MINIMAL
NAMIBIA	0	2,531,794	0.000000	NONE KNOWN
NEPAL	0	29,034,515	0.000000	NONE KNOWN
NETHERLANDS	3,751	17,424,978	0.021527	May 2019 Vodafone/Ziggo/Ericsson test in Eindhoven. Aug 2019 T-Mobile tests in The Hague, VodafoneZiggo tests in Maastricht. October 2019 KPN test 5G in Amsterdam, Rotterdam, The Hague. March 2020 KPN starts 5G tests with consumers. November 2019 T-Mobile Netherlands announces that testing of its 5G infrastructure in the Hague has been completed using experimental frequency permits for the 700 MHz, 3.5 GHz and 26 GHz bands, and "The Hague is now 'fully equipped for 5G'". SIGNIFICANT
NICARAGUA	1	6,609,227	0.000015	NONE KNOWN
NIGERIA	23	205,122,116	0.000011	Some reports of testing. No live services. One site reports " "Secondly, there is no deployment of 5G in Nigeria at the moment. The NCC back in November 2019 approved trial test for 5G for a period of three (3) months, and the trial has been concluded and installation decommissioned". MINIMAL
NORWAY	113	5,412,516	0.002088	March 2017 demo in Fornebu. End of Sept 2019, first pilot project to connect two Norwegian locations in a trial. December 2019 Norway completes 'vendor selection'. MINIMAL
OMAN	7	5,079,644	0.000138	November 2017 Omantel begins testing. December 2019. some live services launched. MINIMAL
PAKISTAN	7	220,051,592	0.000003	Some testing August 2019. MINIMAL
PARAGUAY	8	7,115,481	0.000112	NONE KNOWN
PERU	400	32,875,731	0.001217	2019 Huawei conducts tests. MINIMAL

PHILIPPINES	428	109,276,358	0.000392	June 2019 Globe Telecom/Huawei launch live service to 10's of thousands of homes. SIGNIFICANT
POLAND	181	37,854,937	0.000478	June 2018 Orange and SK Telecom work on tests with Nokia. September 2019 Orange Poland/Ericsson switch on test network in Warsaw. October 2019 Orange/Nokia launch tests in Lublin. No live services. MINIMAL
PORTUGAL	735	10,202,652	0.007204	March 2019 Vodafone installs first Portugal's first 5G Mast in Lisbon. October 2019 Nos/Huawei launch commercial 5G network in city of Matosinhos. MINIMAL
PUERTO RICO	62	2,874,032	0.002157	NONE KNOWN
ROMANIA	151	19,263,080	0.000784	May 2019 Orange launch live services in Bucharest, Cluj-Napoca and Lasi. June 2019 Digi switch on live service in Bucharest. MINIMAL
RUSSIA	405	145,922,862	0.000278	August 2019 Tele2/Ericsson launch pilot in Moscow. August 2019 Putin reserves selected 5G frequencies for military use. Feb 2020 Russian news agency TASS announces 5G rollout will not start until after 2020. MINIMAL
SAUDI ARABIA	103	34,707,306	0.000297	Feb 2019 STC/Ericsson launch services, 1000 towers deployed. Feb 2020 report says Saudi Arabia has 5,797 towers across 30 cities. SIGNIFICANT
SINGAPORE	11	5,842,126	0.000188	June 2019 Announcements of funding made available for testing to commence. June 2019 Announcement of trials for a 'smart shipping port' to develop over an 18 month period. August 2019 Singapore inviting participants for trials. March 2020 Bloomberg reports rollout 'on track to start this year'. MINIMAL
SLOVENIA	74	2,078,880	0.003560	March 2020 Slovenia halts 5G plans to investigate Health and Safety. No installations known. MINIMAL
SOMALIA	7	15,801,668	0.000044	NONE KNOWN
SPAIN	21,852	46,751,076	0.046741	2018 Vodafone/Ericsson/Telefonica begin commercial development. Feb 2018 Orange announces it will trial 5G in 4 Spanish cities during 2019. April 2019 Orange announces 'major milestone in deployment of 5G networks with first live voice and data call. June 2019 Vodafone (over Huawei network) launches live services in Madrid, Barcelona, Valencia, Sevilla, Málaga, Zaragoza, Bilbao, Vitoria, San Sebastián, A Coruña, Vigo, Pamplona, Gijón, Logroño y Santander. 2018. Madrid, Valencia, Segovia, Sevilla, Barcelona, Girona, Talavera de la Reina. EXTENSIVE
SOUTH AFRICA	4	8,641,786	0.000046	August 2018 Vodacom Lesotho provides a limited connection for some mining and financial sector clients. Following tests, Rain 5G opened a service to "some existing customers that are within its current coverage area". MINIMAL
SOUTH KOREA	236	51,260,274	0.000460	Oct 2017 U+/Huawei conduct successful trials and 28GHz (mm wave). End Nov 2017 SK Telecom announces it is extending 28GHz (mm wave) services. April 2019 <u>KT goes live nationwide</u> . April 2019, <u>SK goes live nationwide</u> . April 2019 U+ goes live nationwide. EXTENSIVE
SUDAN	12	43,640,627	0.000027	NONE KNOWN
SWEDEN	1,580	10,086,360	0.015665	December 2018 State auctions licenses for 5G at 700MHz frequency. December 2018. Telia/Ericsson/Volvo launch 5G network in Eskilstuna, one for self-driving electric trucks at a storage facility in Jönköping and a third at the Royal Institute of Technology in Stockholm. May 2019 Telia launches 5G network linking universities in Östersund and Sundsvall. During 2019, state auctions 5G wireless spectrum licences for 3.4GHz-3.8GHz. Telia says that it will continue to develop 5G technology during 2019 within the framework its '5G partnership program.' but that its more extensive plans are dependent on auction of licenses in the 26.5GHz-27.5GHz band, planned for 2020. SIGNIFICANT
SWITZERLAND	1,406	8,641,786	0.016270	April 2019 Swisscom starts nationwide rollout. April 2019 Sunrise announces live 5G services in 150 locations across Switzerland. The country has live services in Bern, Basel, Zurich, Winterthur, Zofingen, Lenzberg and small towns across the country. EXTENSIVE
SYRIA	4	17,500,658	0.000023	NONE KNOWN
TAIWAN	6	23,808,517	0.000025	September 2016 conducts tests in Taipei. December 2016 FET conducts tests. MINIMAL
TANZANIA	10	59,734,218	0.000017	NONE KNOWN
THAILAND	47	69,767,311	0.000067	November 2018 AIS in collaboration with Nokia, Huawei and ZTE, begin tests. Feb 2019 Huawei sets up its third test bed in Thailand. MINIMAL
TURKEY	2,140	84,903,619	0.002521	Feb 2018 Turkcell and Samsung sign letter of good intent to collaborate on 5G. August 2019 Turkcell in collaboration with Ericsson set a world speed record in a demonstration. March 2020 Turkcell / Huawei announce successful trial between 2 datacentres in Istanbul. MINIMAL
U.A.E.	33	9,866,825	0.000334	June 2019 Etisalat launches extensive live service. EXTENSIVE
U.K.	16,060	67,540,000	0.023779	March 2018 UK govt. gives £25M in grants to six companies to create 5G test beds. May 2019 <u>EE goes live</u> in London, Edinburgh, Cardiff, Belfast, Birmingham, and Manchester. July 2019 <u>Vodafone goes live</u> in 37 locations: Ambleside, Bebington, Belfast, Birkenhead, Birmingham, Bootle, Bristol, Cardiff, Cheadle and Gately, Droylsden, Eccles, Edinburgh, Glasgow, Horwich, Huyton-with-Roby, Isle of Scilly, Lancaster, Leeds, Liverpool, Llandudno, London, Manchester, Mangotsfield, Newbury, Paisley, Penarth, Plymouth, Prestwich, Rochdale, Salford, Solihull, Stockport, Stoke-on-Trent, Stretford, Wallasey, Warrington and Wolverhampton. October 2019 <u>O2 goes live</u> in London, Leeds, Belfast, Cardiff, Slough and Edinburgh, and announces that it will have services in 14 more towns and cities by the end of 2019, and a total of 50 by summer 2020. February 2020 <u>Three goes live</u> in 66 locations. EXTENSIVE
U.S.A.	41,114	329,227,746	0.012488	October 2017 AT&T, Verizon, Sprint start trials. September 2018 city of Mill Valley, California, bans 5G over health concerns. December 2018 AT&T has live network in Waco, Texas. April 2019 CNN reports 5G availability as: Verizon - Atlanta, Denver, Detroit, Indianapolis, Phoenix, Providence, Rhode Island, St. Paul, Minnesota, and Washington, DC, with the expectation of expanding to 30 cities by the end of 2019. AT&T - Austin, Charlotte, Dallas, Houston, Jacksonville, Las Vegas, Los Angeles, Louisville, Nashville, New Orleans, New York City; Oklahoma City, Orlando, Raleigh, San Antonio, San Diego, San Francisco; San Jose, Waco. Sprint - Atlanta, Chicago, Dallas-Fort Worth, Houston, Kansas City, Los Angeles, New York City, Phoenix and Washington, DC. T-Mobile - Atlanta, Cleveland, Dallas, Las Vegas, Los Angeles and New York. CNN noted that coverage was limited in many of those locations. August 2019 AT&T launches new 5G service in New York City. Sprint announces that it has coverage for 1.7million people in New York. September 2019 Verizon launches in New York City. December 2019 AT&T launches new 5G service in Washington DC., San Francisco, Los Angeles. March 2020 post from '5G Radar' says that Verizon is targeting 50 percent US coverage by later in 2020. Due to the vast size of the country and the limited coverage in many locations, this has been categorised as 'significant' rather than extensive. SIGNIFICANT
UKRAINE	151	43,781,552	0.000345	May 2019 Lifecell/Ericsson conduct tests in Kiev. MINIMAL
URUGUAY	14	3,471,413	0.000403	April 2019 Antel launches initial services in La Barra and Nueva Palmira. Aug 2019 Mutual letter of intent Uruguay/Huawei. MINIMAL
VENEZUELA	9	28,435,940	0.000032	NONE KNOWN
VIETNAM	0	97,338,579	0.000000	Feb 2019 trial in Hanoi and Ho Chi Minh. MINIMAL
YEMEN	0	29,694,410	0.000000	NONE KNOWN
ZAMBIA	3	18,280,440	0.000016	NONE KNOWN

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