P.2024/115

THE STATES OF DELIBERATION
of the
ISLAND OF GUERNSEY

COMMITTEE *for* ECONOMIC DEVELOPMENT

SPECTRUM LICENSING FRAMEWORK TO DEPLOY 5G AND SUCCESSIVE TECHNOLOGIES

The States are asked to decide:-

Whether, after consideration of the policy letter entitled 'Spectrum Licensing Framework to Deploy 5G and Successive Technologies' dated 19th December 2024, they are of the opinion:-

1. To endorse the policy principles and objectives outlined in Section 11.

2. To direct the Guernsey Competition & Regulatory Authority to develop and implement a spectrum licensing framework to deploy 5G and successive technologies to the Bailiwick of Guernsey taking into account the policy principles and objectives endorsed in proposition 1.

3. To direct the Guernsey Competition & Regulatory Authority to report to the Committee *for* Economic Development on how it has exercised its functions and powers in accordance with the States Directions in proposition 2 in its Annual Report & Accounts.

The above propositions have been submitted to His Majesty's Procureur for advice on any legal or constitutional implications in accordance with Rule 4(1)(c) of the Rules of Procedure of the States of Deliberation and their Committees.

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The Presiding Officer
States of Guernsey
Royal Court House
St Peter Port

19th December 2024

Dear Sir,

1 Executive Summary

1.1 This policy letter seeks the States to endorse the policy principles and objectives and to make the necessary directions to enable the deployment of next generation mobile telecommunications ("**telecoms**") technologies to the Bailiwick of Guernsey ("**Bailiwick**").

Scope of policy letter

1.2 Telecoms services are delivered in three ways: (i) fixed line broadband via copper or fibre cables, (ii) mobile (wireless) connectivity, or (iii) satellite broadband. The scope of this policy letter relates to mobile (wireless) connectivity only.

The need for next generation digital infrastructure

1.3 Delivering next generation digital infrastructure has been a strategic priority for the Committee *for* Economic Development ("**the Committee**") for several years. In 2017, "delivering next generation digital infrastructure" was published by the States as one of the four key aims in the Digital Sector Strategic Framework[1], which has since been reinforced in several other strategic sources, as detailed in **Section 2**.

1.4 Next generation digital infrastructure will deliver resilient, fast, future-proof digital connectivity to homes, businesses and public services, enabling a thriving digital economy.

[1] The Digital Sector Strategic Framework (2017): https://gov.gg/CHttpHandler.ashx?id=107224&p=0

1.5 Today, the aim to deliver next generation digital infrastructure remains critically important to deliver sustainable economic growth and prosperity to the Bailiwick. The current Government Work Plan ("**GWP**") 2023-25[2] lists the delivery of an "enabling digital infrastructure" as a prioritised Committee workstream.

Developing the Bailiwick's telecoms connectivity – an evolutionary process

1.6 To support the development of a world-class telecoms infrastructure, the Committee outlined several policy interventions and actions in the Delivering Next Generation Digital Infrastructure Policy Letter[3] which was debated and approved by the States in October 2021. See **Section 2** and **Appendix 1**.

1.7 This includes two core policy interventions to develop telecoms connectivity – island-wide fibre rollout and the deployment of next generation mobile technology (5G and beyond).

Fibre rollout

1.8 A key element of the States debate in October 2021 was to enable an accelerated and universal rollout of fibre broadband to premises in Guernsey. The approved solution was a proposal from Sure (Guernsey) Limited ("**Sure**") to achieve a ubiquitous and equitable full island fibre to the premises wholesale broadband network requiring a grant of up to £12.5million from the States to assist accelerating the build time and cover uneconomic areas of the island.

1.9 The States approved the propositions to provide the required investment and enter into a contract with Sure with the key objectives of achieving a single regulated wholesale fibre network and completing an island wide rollout of fibre connectivity so that all premises are connected by the end of 2026.

1.10 It was agreed that all locally licensed telecoms operators should have non-discriminatory access to the wholesale fibre network at the regulated rates approved by the Guernsey Competition & Regulatory Authority ("**GCRA**"), ensuring competition at the retail level.

Deployment of a next generation mobile network (5G and beyond)

1.11 At the time of the States debate in October 2021, the Committee acknowledged that there were a number of issues to be examined and addressed in relation to next generation mobile technology – notably environmental issues and the feasibility of local telecoms operators to invest in the latest technologies.

[2] P.2023/96, Billet d'État I of 2024: https://www.gov.gg/CHttpHandler.ashx?id=170639&p=0
[3] P.2021/106, Billet d'État XX of 2021: https://www.gov.gg/CHttpHandler.ashx?id=144068&p=0

1.12 The final proposition approved during the debate was for the Committee to submit a policy letter on the licensing of next generation mobile technology, which is being met via the submission of this new policy letter entitled 'Spectrum Licensing Framework to Deploy 5G and Successive Technologies'.

1.13 For reasons explained in this policy letter, the Committee is **not** currently recommending mandating a single island wide network to deploy next generation mobile technologies (5G and successive technologies), which is an updated position from its preference in 2021 (see **Section 2.6**).

The case for 5G and successive technologies

1.14 Today, 5G networks are available in most advanced economies, and it is estimated that by 2025, 5G networks are likely to cover one-third of the world's population[4]. The adoption of 5G by mobile users is growing rapidly across the globe (see **Section 8.2**) so it is critical that the Bailiwick encourages the creation of an enabling environment locally to support the deployment of 5G and successive technologies, or risk getting left behind.

1.15 Redsky Guernsey Limited ("**Redsky**") describes 5G technology as "the bedrock of economic growth and innovation, offering mobility in business, creating disruptive business models and unlocking new commercial prospects." See **Appendix 2** for the Redsky 5G strategy report.

1.16 The Committee is of the view that the benefits offered by 5G and successive technologies (**Section 3.3**) will enable the deployment of new applications and use cases to drive economic and social value. It is also critical that the Bailiwick maintains its competitive edge from a digital perspective.

1.17 All economic sectors will benefit, with a significant potential to deliver more efficient and sustainable public services (**Section 3.3** and **Section 4.2**). In a report published by PwC, it predicts that 5G will boost global GDP by US$1.3trillion across a 10-year period (by 2030) with more than half of the economic gains in the healthcare sector[5].

Spectrum licensing

1.18 To deploy new next generation mobile networks, telecoms operators are required to access the rights to specific frequencies or bands of the

[4] GSMA 5G Global Launches & Statistics: https://www.gsma.com/futurenetworks/ip_services/understanding-5g/5g-innovation/

[5] PwC report, The global economic impact of 5G: https://www.pwc.com/gx/en/tmt/5g/global-economic-impact-5g.pdf

electromagnetic spectrum via the award of a spectrum licence. An explanation of spectrum and spectrum licensing can be found in **Section 6**.

1.19 Spectrum is a limited resource, and the Committee is committed to ensuring it is utilised to best meet the economic needs of the Bailiwick.

1.20 The UK's Office for Communications ("**Ofcom**") and the Global System for Mobile Communications Association ("**GSMA**") recommend that the effective modern-day spectrum management needs technology neutral ("**Tech Neutral**") licences to deploy next generation mobile infrastructure. Read more about Ofcom's new spectrum strategy in **Section 9**.

1.21 Tech Neutral spectrum licensing will help enable local telecoms operators to deploy 5G and successive technologies in line with market demand and by keeping pace with emerging technologies. This progressive approach offers an incredible opportunity to the Bailiwick as an innovative, flexible and forward-looking way to manage spectrum – a real economic enabler. See **Section 10.**

Purpose of this policy letter

1.22 In accordance with section 3(1A) of the Regulation of Utilities (Bailiwick of Guernsey) Law, 2001 ("**Regulation Law**")[6], the States may, on the recommendation of the Committee and after consultation with the GCRA, give strategic or general directions to the GCRA concerning the priorities it should take into account in the exercise of its functions and powers under the Regulation Law.

1.23 The GCRA has been consulted on this policy letter and is fully supportive. See **Appendix 7**.

1.24 The Committee is therefore asking the States to endorse the policy principles and objectives in **Section 11** and to give directions to the GCRA to develop and implement a spectrum licensing framework to deploy 5G and successive technologies to the Bailiwick, taking into account the States approved policy principles and objectives.

1.25 This policy letter also addresses the States' Resolution for a policy letter on 5G to be debated by the States Assembly as outlined in the Requête[7] dated 20th January 2020.

[6] The Regulation of Utilities (Bailiwick of Guernsey) Law, 2001 ("**Regulation Law**"). Available from: https://www.gcra.gg/media/er4fvdym/the-regulation-of-utilities-bailiwick-of-guernsey-law-2001-consolidated.pdf

[7] P.2020/8, Billet d'État V of 2020: https://www.gov.gg/CHttpHandler.ashx?id=123029&p=0. Requérants: Deputies H L de Sausmarez, L B Queripel, V S Oliver, J S Merrett, M J Fallaize, E A McSwiggan, S L Langlois.

2 Strategic Context – Delivering Next Generation Digital Infrastructure

2.1 The aim to "deliver next generation digital infrastructure", a vital economic enabler, was first published by the States in the Digital Sector Strategic Framework (April 2017)[8]. The action to achieve this was detailed as "establishing a flexible and world-class digital infrastructure", which aligned with the "digital connectivity" policy initiative published in the Policy & Resource Plan[9] approved by the States in November 2017.

2.2 The strategy was developed further through the Future of Telecoms[10] strategy published by the Committee in June 2018 and through the Delivering Next Generation Digital Infrastructure Policy Letter[11] which was debated and approved by the States in October 2021.

2.3 The overarching policy objective published in the 2021 policy letter was, "to ensure the Bailiwick of Guernsey is one of the most digitally connected jurisdictions in the world where society, culture and the economy can leverage, and maximise, the opportunities of the digital age whilst ensuring maintenance and protection of the environment."

2.4 To achieve this overarching objective, the policy letter outlined several policy interventions across the telecoms connectivity journey, including actions for implementation. **Appendix 1** shows the summary of policy interventions and actions.

2.5 Two core policy interventions related to "on-island connections and network" are:

- "Achieving 100% fibre roll out to the premises (home and business) within 5 years".
- "Enable deployment of a next generation mobile network (5G and beyond)".

2.6 At the time of publishing the policy letter, the preference was to encourage the "adoption of a single network – retail competition not network competition" due to economic and environmental considerations, which can be seen in the in **Appendix 1** under the header "the environment, resilience and health and safety".

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[8] The Digital Sector Strategic Framework (2017): https://gov.gg/CHttpHandler.ashx?id=107224&p=0
[9] The Policy & Resource Plan (2017): https://gov.gg/CHttpHandler.ashx?id=110312&p=0
[10] The Future of Telecoms (2018): https://www.gov.gg/CHttpHandler.ashx?id=113783&p=0
[11] P.2021/106, Billet d'État XX of 2021: https://www.gov.gg/CHttpHandler.ashx?id=144068&p=0

2.7 Delivering next generation digital infrastructure has since been reaffirmed as a strategic priority for the States through publication of The Digital Framework 2021-2025[12] and various iterations of the 2021-2025 GWP[13]. The current 2023-25 GWP[14] includes the prioritised Committee workstream to, "accelerate the digital economy – a vital economic enabler including next generation infrastructure, regulation and legislation to maintain global competitiveness."

2.8 The rollout of fibre infrastructure is progressing well[15], accelerated by the £12.5m capped 'Digital Accelerator Investment' granted from the States in 2021[16] to deliver universal and equitable access to fibre. Replacing the legacy copper-based telecoms networks with fibre cables is critical to ensure islanders and businesses can make optimum use of digital technology for family life and for business growth and development. The fibre roll-out project is ahead of schedule, with a target completion of the end of 2026.

Fibre and next generation mobile connectivity

2.9 The provision of a next generation mobile network will complement the island-wide fibre network.

2.10 Fibre connects to a specific location such as a home or business, where a router is installed to provide wireless (wi-fi) connections. Fibre connectivity is fast and reliable, however the reach of wi-fi connections is typically limited. The connectivity from 5G and successive technologies is wireless, which offers flexibility and mobility. This is beneficial for 'on the go' communications, to support more flexible and remote working and to have access where domestic or commercial wi-fi networks have limited reach.

2.11 5G and successive technologies will support the provision of new applications, services and experiences that are not possible today, thereby enabling innovation. The benefits of higher data rates, low latency and increased capacity (**Section 3.3**) are essential to support AI-driven apps, smart devices, augmented reality and Internet of Things ("**IoT**") devices.

2.12 The prospect of ubiquitous island-wide fibre connectivity along with the ability to deploy services enabled by 5G and successive technologies will be a highly attractive proposition for people and businesses looking to visit and relocate to the island, or to use the island as a test bed for innovation.

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[12] Digital Framework 2021-2025: https://www.gov.gg/CHttpHandler.ashx?id=145469&p=0
[13] P.2021/71, Billet d'État XV of 2021: https://www.gov.gg/CHttpHandler.ashx?id=140789&p=0
[14] P.2023/96, Billet d'État I of 2024: https://www.gov.gg/CHttpHandler.ashx?id=170639&p=0
[15] 24,348 premises built (76% of the island) and 14,881 premises are connected to fibre (55% of total broadband and voice connections). The project is 3 months ahead of schedule. Source: Fibre To The Premises ("**FTTP**") Oversight Group minutes, 28/11/24.
[16] P.2021/71, Billet d'État XV of 2021: https://www.gov.gg/CHttpHandler.ashx?id=140789&p=0

3 About 5G – The Next Generation Mobile Network

3.1 Mobile networks have evolved in line with technological advancements, with evolution defined by several global communication standards (a.k.a. "generations"). The first generation ("**1G**") was introduced in the 1980s, followed by the second generation ("**2G**") in the 1990s. The third generation ("**3G**") and forth generation ("**4G**") were introduced in the 2000s and 2010s respectively.

3.2 5G is the successor to 4G and started to be deployed by global telecoms operators in 2019.

3.3 The difference between the global communication standards is primarily the data transfer rate, with speeds increasing as technology has advanced. 5G offers faster download speeds, more reliable wireless connections and improved coverage when using smartphones and other devices. The benefits offered by 5G and successive technologies will enable the rollout of new applications and use cases to drive economic and social value.

- **Faster download speeds:** 5G speeds will be around 150-250Mbs for the average user in the Bailiwick, potentially reaching 10Gbps for some specialist applications. This is significantly faster than the speeds possible on the current 4G, 3G and 2G networks.

- **Lower latency:** Latency refers to the length of time for data to travel between devices. This can be as low as 1 millisecond in a 5G network, resulting in an almost instantaneous response time. This benefits real-time activities where reliable and quick data transfer is critical to performance levels. This includes smart devices, gaming, augmented reality, and the ever-growing volume of IoT devices.

- **Increased capacity:** 5G can handle a greater number of devices being connected to the network at the same time. Lower latency and increased capacity offer the potential for new, innovative services to be developed through IoT devices such as smart applications and sensors. Guernsey Water already offers remote monitoring of water pump performance, and the deployment of 5G will support the introduction of additional 'smart city solutions' such as smart streetlights and other smart public services, offering social and sustainability benefits to the Bailiwick.

3.4 As next generation mobile networks are deployed, older legacy networks are retired. This is currently the situation with 3G and 2G networks being gradually switched-off around the world. Each country is managing their own switch-off timetable – the USA has already completed its 3G switch-off and UK operators

are planning to switch-off 3G across 2024 and 2025[17].

3.5 6G is expected to start rolling out towards the end of the 2020s and into the 2030s.

4 Economic and Social Benefits of 5G to the Bailiwick

4.1 As detailed in section 2(c) of the Regulation Law, the States and the GCRA each have general duties to "ensure that utility activities are carried out in such a way as best to serve and contribute to the economic and social development and well-being of the Bailiwick".

4.2 Redsky's 5G Strategy report (**Appendix 2**) provides an informed and evidence-based assessment of the effects of 5G technology to the Bailiwick. A summary of the economic and societal benefits is outlined here:

- The rollout-out of 5G is expected to be a game changer for the Bailiwick, by generating economic and social value and robust global connectivity.
- All economic industries will benefit, with significant potential for 5G to enable the development of applications to deliver more efficient and sustainable public services, such as remote patient monitoring, telemedicine and other healthcare services.
- The benefits of a 5G network will enable local businesses to compete on a global scale and attract foreign businesses and investment.
- High speed connectivity will unlock new opportunities and enable innovative business models and start-ups to thrive.
- A 5G network will enable the Bailiwick to remain competitively positioned, in particular by attracting tourists, relocators, remote workers and digital nomads to the island.
- Beyond business, 5G also enriches personal lives, enhancing communication and offers access to an array of services that have become indispensable in modern life.

5 Environmental, Public Health, Safety and Security Concerns

5.1 At the time of publishing the 'Delivering Next Generation Digital Infrastructure Policy Letter in 2021, the Committee acknowledged that there were a number of

[17] Ofcom 3G switch-off advice: https://www.ofcom.org.uk/phones-telecoms-and-internet/advice-for-consumers/advice/3g-switch-off

issues to be examined and addressed.

Masts and considerations for a single network

5.2 In 2021 it was anticipated that 5G deployment may likely result in further mast proliferation, and therefore the preference at the time was for a single network due to economic and environmental considerations. Section 10.2 of the 2021 policy letter stated:

> "Environmental impact (especially visual and electro-magnetic spectrum) needs careful consideration in the deployment of mobile networks. Logic dictates that one single network would avoid duplication of effort and cost and have least environmental impact.
>
> However, downsides include less resilience and the need to ensure a level playing field access to this network. However, delivery of one network across multiple operators may be difficult to achieve practically, at least in the short term until technologies evolve and merge."

5.3 Since that date, it has become apparent that 5G deployment will not result in the additional mast requirements that were anticipated in 2021.

5.4 A notable benefit of Sure's recent acquisition of Guernsey Airtel Ltd ("**Airtel**") is that the new network configuration will provide the capacity needed to serve the combined customer base using a more energy-efficient network with a lower power consumption, reduced carbon emissions and less visual impact compared with operating two separate networks. It is anticipated that there will be a reduction in the number of mobile network sites currently used on the Sure and Airtel independent networks from 88 in 2023 to 62 by 2027.

5.5 The GCRA supports the view that mandating a single 5G network at this time may rule out innovative opportunities in the future. The GCRA's consultation response can be seen in **Appendix 7**.

5.6 JT (Guernsey) Ltd ("**JT**") has also invested in a new network which will support 5G deployment in the Channel Islands. In its consultation response, JT stresses the importance of JT being granted the same 5G spectrum in Guernsey as it has received in Jersey, in order to continue to providing quality competitive mobile services locally.

5.7 For the reasons stated above, the Committee considers that it is not necessary at this time to mandate a single network. There are clear advantages of maintaining network competition between the existing operators, and there may well be innovative opportunities arising in the future.

5.8 The island is already serviced by island-wide 4G connectivity, which delivers high speeds suitable for many uses, so currently there is not necessarily a case for needing island-wide 5G coverage immediately. As happened with 4G it is fully anticipated that this will develop over time and will be driven by market dynamics.

Public health and safety

5.9 Redsky's 5G Strategy report (**Appendix 2**) and 5G Safety report (**Appendix 3**) confirm that primary concerns surrounding 5G often arise from misinformation and misconceptions. The reports provide reassurances over the safety of 5G technology, with the current evidence demonstrating that non-ionising radiation from mobile networks (such as 5G) does not pose a significant threat to human health when adhering to international guidelines.

5.10 The GCRA is responsible for ensuring that emissions from mobile masts are well within the safe limits as mandated by the International Commission for Non-Ionising Radiation Protection ("**ICNIRP**") and other relevant guidelines from time to time (**Section 6.6**).

5.11 The GCRA undertakes periodical mast audits and publishes the results on the GCRA mast website[18] which shows the emission levels from all mobile masts in Alderney, Guernsey and Sark. The GCRA recently announced that its 2024 mast audit has been completed and confirms that emissions remain comfortably within internationally recognised safe levels.[19]

5.12 In anticipation of the possible introduction of 5G technology to the Bailiwick in 2019, the States Public Health Services and the Office of Environmental Health & Pollution Regulation undertook a review of research and relevant regulatory mechanisms in place locally. Their 2019 review indicated that there was "insufficient evidence of adverse health or environmental effects of electromagnetic field radiation connected to the use of 5G frequencies."

5.13 In August 2024, the States Public Health Services and the Office of Environmental Health & Pollution Regulation undertook a review of new literature and "identified no new concerns", as per the updated joint position statement in **Appendix 4**. In summary, Public Health Services and the Office of Environmental Health & Pollution Regulation "could find no indication to impose tougher restrictions than are currently in place."

[18] GCRA mast audits website. Available from: https://mastaudits.gcra.gg/

[19] Bailiwick Express news, 2nd December 2024, Guernsey's mobile mast emissions within safe levels. Available from: https://gsy.bailiwickexpress.com/gsy/news/guernseys-mobile-mast-emissions-still-within-safe-levels/

Telecoms Security Requirements

5.14 Concerns relating to telecoms security are being addressed by the Committee *for* Home Affairs ("**C*f*HA**") via the development of a telecoms security policy letter. It is anticipated that this policy letter will make it a mandatory requirement in future to replace high-risk vendor ("**HRV**") equipment in all telecoms networks.

5.15 Sure's acquisition of Airtel, following the States' approval of a temporary and exemption to the Competition Law[20], will facilitate an earlier replacement of HRV equipment in its new core network. A binding commitment from Sure is to remove all HRV equipment within 20 months from the date of completion.[21]

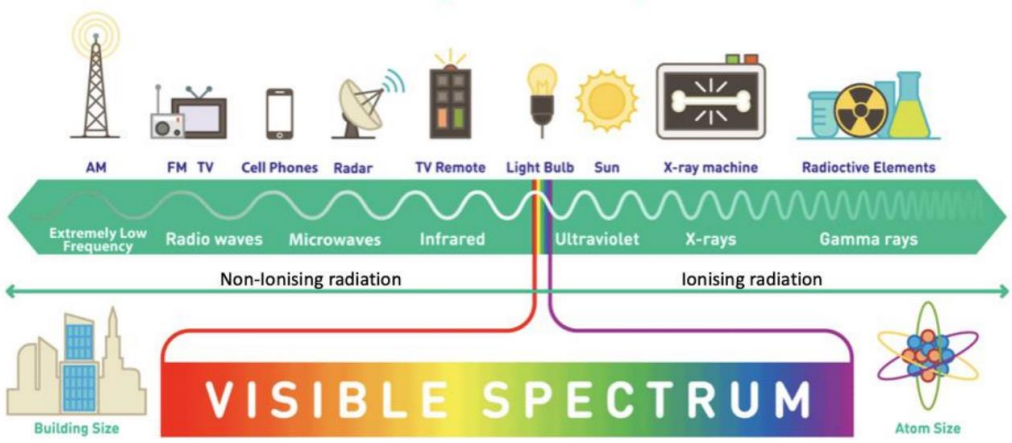
Guardrails

5.16 Redsky 5G Safety report (**Appendix 3**) demonstrates that 5G is safe when deployed with appropriate guardrails in place, which the Committee has built into the policy principles and objectives shown in **Section 11**.

6 Spectrum and Spectrum Licensing

6.1 The electromagnetic spectrum is the full range of electromagnetic radiation, organised by frequency or wavelength. It ranges from low frequency (long wavelength) to high frequency (short wavelength). The electromagnetic spectrum is divided into several groups, spanning from radio waves at the low frequency end, through to gamma rays at the high frequency end (**Diagram 1**).

Diagram 1: The electromagnetic spectrum[22]



[20] P.2024/75, Billet d'État XVI of 2024: https://www.gov.gg/CHttpHandler.ashx?id=181393&p=0
[21] Included as 'Requirement 7' in Appendix 1 of the Competition Law policy letter (link in footnote 20)
[22] Source: Redsky 5G Strategy Report (Appendix 2)

6.2 Radio waves are used for many wireless communication purposes. This includes broadcasting television, radio, satellite transmissions, mobile communications (calls, text and data) and any other device that communicates wirelessly, such as key fobs and baby monitors. **Diagram 1** shows that radio spectrum is positioned at the low frequency end of the spectrum, before microwaves, infrared and visible light. Page 8 of the Redsky 5G strategy report (**Appendix 2**) provides more information on mobile spectrum.

6.3 Spectrum for mobile communications is a finite resource, and its use is regulated to provide equitable access and to minimise interference between users. In the UK, Ofcom is responsible for regulating and managing spectrum. The Communications Act 2003 requires that Ofcom encourages the 'optimum' use of spectrum and maximises the economic benefits. As well as fulfilling these duties, Ofcom has a wider ambition to make the UK a leader for wireless investment and innovation.[23]

6.4 In the Bailiwick, anyone wishing to supply any telecoms services must first apply to the GCRA for a licence and an associated award of spectrum. The GCRA will then usually consult, and depending on the outcome of that consultation will decide on the merits of the application.

6.5 Should the GCRA approve the licence application, it will then make a recommendation for spectrum licensing to Ofcom. Where Ofcom judges the recommendation to be consistent with its statutory duties, a licence may then be granted subject to payment of the appropriate spectrum fee.[24]

6.6 Included in every licence granted by the GCRA are the requirements for operators to ensure that non-ionising radiation emissions from its Licensed Mobile Telecommunications Network are within the limits specified by the guidelines published by the International Commission for Non-Ionising Radiation Protection ("**ICNIRP**") and that it complies with any radiation emission standards adopted and published from time to time by the European Telecommunications Standards Institute ("**ETSI**") and any other standards specified by the GCRA.

6.7 Any telecoms operator that fails to meet those conditions contained within the licence granted by the GCRA and who is found guilty of an offence is liable to prosecution which can lead to a revocation and suspension of a licence along

[23] Ofcom Guide to the Spectrum Framework Review, September 2005. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0012/34104/sfr_guide.pdf

[24] The licensing of spectrum, in the UK, Guernsey and the other Crown Dependencies, is carried out by the Ofcom, by virtue of the powers given to it by the Wireless Telegraphy Act 2006 ("**WTA**") and the Communications Act 2003, as and to the extent that these Acts are extended to the respective islands. In addition, a Memoranda of Understanding ("**MoU**") between the UK and Guernsey sets out the coordination criteria for the radio spectrum bands to reduce the likelihood of interference across borders. Source: https://www.ofcom.org.uk/spectrum/frequencies/channel-islands-and-isle-of-man/

with a significant financial penalty and in the most serious of cases can lead to both imprisonment and/or a substantial fine.

6.8 The GCRA's 2024 work plan[25] confirms the areas of focus for 2024, the third and final year of the GCRA's three year Strategic and Operational Priorities Plan. 5G spectrum awards is included as an area of focus for 2024 and the GCRA confirms:

> "our role is about crafting an environment where mobile operators can flourish, providing high-quality services that drive technological progress and societal connectivity. A key part of this, where we will serve as a critical architect, will be managing the allocation of government-issued mobile spectrum to enable the construction and launch of 5G networks. We will therefore be working with the States of Guernsey and other stakeholders in the development of policy to inform the approach to awards."

7 Early Work to Deploy 5G in the Channel Islands in 2019/2020

7.1 In 2019, work commenced on developing a pan-Channel Islands approach to 5G licensing, co-ordinated by the Channel Islands Competition & Regulatory Authority ("**CICRA**"). CICRA's role was to ensure the optimal use of 5G spectrum across the Channel Islands.

7.2 CICRA was dissolved in April 2020 and the responsibility for spectrum licensing reverted to each Island's respective regulator, the GCRA and the Jersey Competition Regulatory Authority ("**JCRA**"). See **Appendix 5** for information on CICRA's 5G consultation in 2019/2020.

7.3 At this time, evidence was limited regarding the impact of 5G on the environment and public health, and concerns had been raised by some members of the community.

7.4 A Requête[26] entitled "Ensuring that a Policy Letter on the policy governing 5G Technology is debated by the States Assembly" (dated 20th January 2020) was laid on 23rd April 2020. The intention of the Requête was not to direct a debate about whether 5G should or shouldn't be deployed locally. The aim was for the States to debate the 5G policy.

7.5 During the Requête debate, some States Members raised concerns and questions relating to the economic, social, health, safety, security and

[25] GCRA Workplan 2024: https://www.gcra.gg/media/0y4f04sm/gcra-workplan-2024.pdf

[26] P.2020/8, Billet d'État V of 2020: https://www.gov.gg/CHttpHandler.ashx?id=123029&p=0. Requérants: Deputies H L de Sausmarez, L B Queripel, V S Oliver, J S Merrett, M J Fallaize, E A McSwiggan, S L Langlois.

environmental impacts of deploying 5G[27], and approved the proposition to direct the Committee to present a Policy Letter to the States by the end of 2020, detailing its recommended policy on 5G Technology, including specific reference to the licence conditions and criteria.

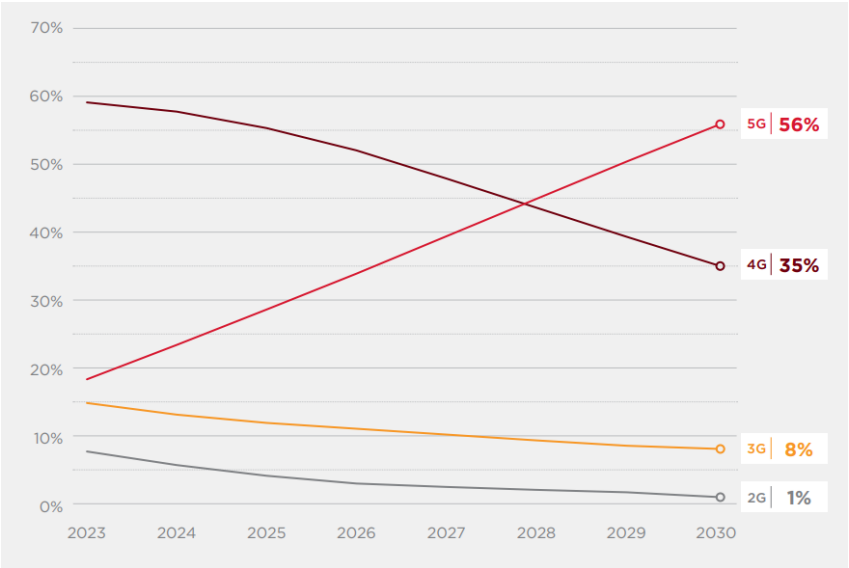
7.6 Shortly after the Requête debate, the States and the Government of Jersey put a hold on developing a 5G licensing framework given the uncertainties surrounding the COVID-19 pandemic and the need to reallocate resource to provide business support, along with some concerns surrounding the potential risk of HRV equipment being present in the 5G infrastructure.

8 Situation Today

8.1 5G mobile technologies are becoming more mainstream, with the ability to connect seamlessly to 5G networks being a common feature of modern mobile phones.

8.2 As of January 2024, 261 telecoms operators in 101 countries had launched commercial 5G mobile services, with a further 90 telecoms operators committed to launch 5G in the coming years. As mobile users migrate to 4G and 5G, 143 legacy networks (2G and 3G) are scheduled to be retired between the end of 2023 and 2030, with around half planned before the end of 2024[28] (**Diagram 2**).

Diagram 2: mobile adoption by technology – percentage of total connections



[27] States of Deliberation Hansard, 23rd April 2020. Available from: https://www.gov.gg/CHttpHandler.ashx?id=137913&p=0

[28] GSMA, The Mobile Economy 2024. Available from: https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2024/02/260224-The-Mobile-Economy-2024.pdf

8.3 The Bailiwick is currently serviced by a 4G, 3G and 2G mobile network, provided by three locally licensed telecoms operators – Airtel, JT and Sure. All three operators provide their own mobile network via mobile phone masts which leads to a degree of duplication.

8.4 Sure's acquisition of Airtel was officially completed on 31st October 2024[29], following the States' approval of a temporary and exemption to the Competition Law[30], which will result in two mobile network operators servicing the Bailiwick (JT and Sure) once Sure has built a new 5G-enabled mobile network.

8.5 A binding commitment of the acquisition is for Sure to launch a credible Mobile Virtual Network Operator ("**MVNO**") partner to offer commercial mobile services as a third retail operator within 12 months of the completion date[31]. This will provide the Bailiwick with a third telecoms provider, providing services at the retail level (whilst using Sure's new network described in **Section 8.7** below).

8.6 Sure's owners (the Beyon group of companies) will be making a significant investment in the business across the Channel Islands, including the deployment of a new 5G-enabled network. A significant proportion of this will be in Guernsey, where Sure is headquartered. £25m is already committed to the Fibre to the Premises project. A further direct investment of up to £35m will be made, with £28m being invested in a new core network[32] serving the Channel Islands, of which £10.1m will be directly invested in Guernsey infrastructure and £7.2m on Guernsey specific radio network infrastructure (£17.3m in total).

8.7 JT is planning to retire its 3G network across the Channel Islands on a phased basis from January 2025[33], which will enable it to use repurpose the technology used for 3G to provide faster, more efficient 4G, and in future 5G services. JT's consultation response confirms JT's investment in a new network to support 5G deployment across the Channel Islands, and the importance for JT to provide 5G-enabled mobile services in Guernsey, as it does in Jersey.

8.8 In Jersey, the JCRA opened an invitation to tender process in October 2022, allowing existing telecoms licence holders to submit applications for one of a maximum of three 'Full Service' 5G spectrum packages, intended for island-wide networks, providing publicly available services for the maximum number of users. In January 2023, the JCRA confirmed it had accepted applications from JT

[29] Bailiwick Express News, November 2024. Sure completes Airtel acquisition. Available from: https://gsy.bailiwickexpress.com/gsy/business/sure-completes-airtel-acquisition/
[30] P.2024/75, Billet d'État XVI of 2024: https://www.gov.gg/CHttpHandler.ashx?id=181393&p=0
[31] Included as 'Requirement 2' in Appendix 1 of the Competition Law policy letter (link in footnote 30)
[32] The core network is a shared central network function which will drive the new network across Sure's jurisdictions and is therefore not solely dedicated to Guernsey.
[33] BBC News, December 2023. 3G switch-off in Channel Islands planned by JT. Available from: https://www.bbc.co.uk/news/articles/cqv18lxzw78o

(Jersey) Ltd and Sure (Jersey) Limited[34]. More information about the JCRA's 5G spectrum award process can be found in **Appendix 6**.

9 Ofcom's Spectrum Strategy

9.1 Not only is radio spectrum used for wireless communication purposes; it also plays an increasingly significant role to support growth and innovation across many industry sectors – e.g. automating factories, supporting public services, and monitoring the natural environment. In the face of growing and competing demand for spectrum, Ofcom published a new strategy for spectrum management in July 2021[35] to guide its management of radio spectrum over a ten-year period.

9.2 Ofcom's overarching mission is to "make communications work for everyone" and its vision for spectrum management is centred around four key objectives:

1. Continued improvements in the wireless communications used by everyone, wherever and whenever they use them.

2. Businesses, public sector and other organisations with specialised requirements to be able to access the right wireless communication or spectrum options for them.

3. Increased flexibility in spectrum use to support innovation, with appropriate assurances for continued use.

4. Sustained improvements in the efficiency of spectrum use.

9.3 To deliver these objectives, Ofcom is prioritising actions in three areas:

1. **Supporting wireless innovation.** We will make it easier to access spectrum by:
   i. Making more spectrum available for innovation before its long-term future use is certain, spectrum for pioneers.
   ii. Working to support innovation in new wireless technologies.
   iii. Expanding the work to understand, assist and inform the broad range of organisations who may benefit from wireless technologies in the future.

2. **Licensing to fit local and national services.** We will:

[34]JCRA announces outcome of 5G Spectrum Award ITT. Available from: https://www.jcra.je/media/598693/5g-spectrum-award-itt-outcome-press-release.pdf

[35] Ofcom Spectrum Management Strategy for the 2020s – supporting the UK's wireless future, 19 July 2021. Available from: https://www.ofcom.org.uk/__data/assets/pdf_file/0017/222173/spectrum-strategy-statement.pdf

i. Support the growing diversity of wireless services and providers by considering further options for localised spectrum access when authorising new spectrum use. Licences for larger areas, including national licences, can support wide coverage for public mobile services.

3. **Promoting spectrum sharing.** We will encourage:
   i. Use of better data and more sophisticated analysis when assessing the conditions for sharing.
   ii. Wireless systems to be more resilient to interference from their neighbours.
   iii. An efficient balance between the level of interference protection given to one service and flexibility for others to transmit.

9.4 Ofcom's spectrum strategy recognises that the standard approach of mandating the use of a spectrum band to a specific generation of technology is not sustainable – it is not flexible enough to keep pace with the rate of technological change and the increasingly diverse demands of spectrum from the market.

9.5 Consultation with the GCRA has reinforced Ofcom's position and added that the standard approach of spectrum licensing can also result in some licensees requesting spectrum without offering services across it. Given spectrum is a limited resource and demand for it is increasing, the Committee is committed to ensure that local spectrum allocations can be managed more efficiently.

10 Technology Neutral Spectrum

10.1 Technology neutrality is a principle used in many different contexts. In mobile communications, technology neutral spectrum enables telecoms operators to 'refarm'[36] spectrum used for legacy networks (e.g. 2G, 3G and 4G) for 5G and successive technologies, and to do so at a pace driven by the market and the rate of emerging technologies. Technology neutrality also enables licensees to utilise their full spectrum allocation across all current active technologies.

10.2 The GSMA represents the interests of mobile network operators worldwide. The GSMA recommends that effective spectrum management needs technology neutral licences and this is now best practice. Countries that were among the first to implement Tech Neutral spectrum licences have been rewarded with better coverage and higher mobile broadband speeds.

[36] Refarming is commonly used as a process to govern the repurposing of spectrum bands to more efficient technologies and/or new services (source: GSMA)

10.3 In its June 2019 report[37], the GSMA recommends moving from mandated technology to technology neutrality because, "mandating a specific technology had delivered a standardised market which now no longer needed the protection of a mandated standard in order to flourish."

10.4 The best practice of assigning technology neutral spectrum rights is being adopted by many regulators around the world, notably in the European Union, North America, Singapore, Hong Kong and Australia.[38] A recent example from the UK is Ofcom's September 2022 decision[39] to amend the technical conditions of the mobile licences held by Vodafone and Telefónica to facilitate the deployment of 5G technology.

10.5 Ofcom considered the requests from Vodafone and Telefónica to change their licences and agreed that updating the licences to keep pace with 5G technology and standards development was desirable. Ofcom considered that the updated licences did not displace current spectrum use but rather provided a future upgrade path, at such time as an operators decided, without the need for further regulatory intervention or delay. Although Ofcom recognised that licences may require some further updating over time as technical standards evolve.

10.6 Ofcom's decision aligned with its statutory duties to ensure optimal spectrum use, to promote competition and to support innovation and investment in electronic communications services. Ofcom undertook the licence variations in accordance with its powers as set out in the Wireless Telegraphy Act 2006.

10.7 The GCRA carries similar regulatory responsibilities locally, ensuring that utility services are provided in a way which will best contribute to economic and social development; and with the powers to modify licences in accordance with section 8 of the Telecommunications (Bailiwick of Guernsey) Law, 2001 ("**Telecoms Law**").

10.8 Over recent months, the GCRA has corresponded with its telecoms licensees with a view to publish a consultation aiming to modernise and streamline existing telecoms licences. The GCRA is proposing to consolidate fixed and mobile telecoms licences into a single, comprehensive licence. This new licence will

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[37] GSMA, The Benefits of Technology Neutral Spectrum Licences, June 2019. Available from: https://www.gsma.com/connectivity-for-good/spectrum/wp-content/uploads/2019/06/Benefits-of-Technology-Neutral-Spectrum-Licences.pdf

[38] GSMA, The Benefits of Technology Neutral Spectrum Licences, June 2019. Available from: https://www.gsma.com/connectivity-for-good/spectrum/wp-content/uploads/2019/06/Benefits-of-Technology-Neutral-Spectrum-Licences.pdf

[39] Ofcom's decision to update the technical conditions of Vodafone's and Telefónica mobile licences to enable the deployment of newer technologies including 5G. Available from: https://www.ofcom.org.uk/spectrum/radio-equipment/vodafone-and-telefonica-request-to-update-technical-conditions-of-mobile-licences

remove references to outdated or irrelevant technologies and streamline the spectrum allocation processes to better align with current and future industry needs, adopting a more unified and Tech Neutral licensing approach.

10.9 The GCRA published its 'Telecommunications Licence Modernisation' consultation (T1687G)[40] on 18th November 2024, seeking feedback from consultees by 13th December 2024. The GCRA intends to publish its Proposed Decision and Final Decision early in 2025, aligning with the States' debate of this policy letter.

11 Policy Principles and Objectives

11.1 Strategic objectives to accelerate the digital economy and deliver next generation digital infrastructure are outlined in several strategic sources (**Section 2**), notably the Digital Sector Strategic Framework (April 2017)[41], Delivering Next Generation Digital Infrastructure Policy Letter (October 2021)[42], and the GWP 2023-25 (January 2024)[43].

11.2 Objectives to support the strategies are:

Strategy	**Objective**
Digital Sector Strategic Framework (April 2017)	"Establish a flexible and world-class digital infrastructure."
Delivering Next Generation Digital Infrastructure Policy Letter (October 2021)	"To ensure the Bailiwick of Guernsey is one of the most digitally connected jurisdictions in the world where society, culture and the economy can leverage, and maximise, the opportunities of the digital age whilst ensuring maintenance and protection of the environment."
GWP 2023-25 (January 2024)	"Accelerate the digital economy – a vital economic enabler including next generation infrastructure, regulation and legislation to maintain global competitiveness."

11.3 To support the objectives the Committee recommends that the GCRA develops and implements a spectrum licensing framework to deploy 5G and successive technologies to the Bailiwick taking into account the following policy principles and objectives:

[40] GCRA Telecommunications Licence Modernisation consultation. Available from: https://www.gcra.gg/cases/2024/t1687g-telecommunications-licence-modernisation/t1687g-telecommunications-licence-modernisation-consultation/
[41] The Digital Sector Strategic Framework (2017): https://gov.gg/CHttpHandler.ashx?id=107224&p=0
[42] P.2021/106, Billet d'État XX of 2021: https://www.gov.gg/CHttpHandler.ashx?id=144068&p=0
[43] P.2023/96, Billet d'État I of 2024: https://www.gov.gg/CHttpHandler.ashx?id=170639&p=0

Eight Policy Principles

1. Grant licences to facilitate licencees' delivery of world-class and seamless connectivity to all, maintaining competitivity.

2. Work with Ofcom to manage the efficient and optimal use of spectrum.

3. Plan for future needs.

4. Promote innovation, research and development.

5. Deliver and promote economic growth and sustainability.

6. Protect the environment and public health.

7. Drive cost efficiencies.

8. Adopt best practice governance.

#	Policy Principles	Objectives
1	Grant licences to facilitate licencees' delivery of world-class and seamless connectivity to all, maintaining competitivity.	Ensure that licences are issued to enable licencees to: • Provide mobile connectivity that is accessible and affordable for all Bailiwick residents, organisations and visitors. • Optimise the quality and coverage of mobile technology and facilitate the availability of new mobile services in the Bailiwick in accordance with section 2(e) of the Regulation Law as amended, modified or replaced from time to time. • Deliver a consistently high user experience, even when in highly congested areas of connectivity. • Deliver a smooth transition between mobile networks and enable interoperability with networks outside of the Bailiwick for a seamless roaming user experience. • Deploy 5G and successive technologies in line with, or earlier than the UK[44].
2	Work with Ofcom to manage the efficient and	• Try to ensure spectrum availability for vital public services. • Manage and monitor the efficient and optimal use of

[44] The UK's "Wireless Infrastructure Strategy" (April 2023) sets out the ambition to "deliver high quality 5G to all populated areas in the UK by 2030." Available from: https://www.gov.uk/government/publications/uk-wireless-infrastructure-strategy/uk-wireless-infrastructure-strategy

	optimal use of spectrum.	spectrum allocation across the Bailiwick, taking into account Redsky's recommendations for spectrum optimisation and spectrum defragmentation (**Appendix 2, pages 15-16**). • Adopt a Tech Neutral approach to spectrum licensing. • Try to deliver an enhanced offering either independently or through sharing or partnerships.
3	Plan for future needs.	• Ensure flexibility and adaptability to respond to market forces and technological advancements. • Work with Ofcom to manage spectrum allocation to support current and future digital service needs and use cases, in line with government policy. • Award spectrum licences with sustainability in mind.
4	Promote innovation, research and development.	• Provide early allocation of next generation spectrum for testing and innovation purposes, ensuring it does not limit future use. • Enable the Bailiwick to be used as a testbed for emerging technology uses (e.g. IoT enabled devices). • Encourage innovation and an enterprising culture. • Maximise digital opportunities available currently and in the future.
5	Deliver and promote economic growth and sustainability.	• In line with section 2(c) of the Regulation Law, seek to ensure that technology is adopted "in such a way as best to serve and contribute to the economic and social development and wellbeing of the Bailiwick." • Encourage licencees to enhance day-to-day experiences, such as smoother video calls and quicker downloads, to enhance workplace productivity. • Encourage licencees to enable local businesses to operate and compete on a global scale. • Encourage licencees to attract new business models and innovative start-ups that rely on high-speed connectivity. • Encourage the testing and deployment of new use cases that help grow the economy and society. • Seek to promote the benefits of 5G and successive technologies and provide fact-based information to address apprehensions amongst the public.
6	Protect the environment and public health.	• Try to ensure the rollout of 5G and successive technologies do not result in any adverse impacts to the environment and public health. • Ensure all mobile technologies that licencees are permitted to use adhere to internationally accepted exposure guidelines, such as those provided by the

		ICNIRP, the ETSI and other standards as specified by the GCRA. • Monitor and report on emission levels on a periodical basis. • Try to limit the proliferation of masts and transmitters. • Encourage the removal of redundant mobile infrastructure. • Comply with telecommunication security requirements, such as those detailed in the States Cyber Security Strategy[45] and future telecoms security policy letter published by the C*f*HA.
7	Drive cost efficiencies.	• Try to facilitate the access to spectrum at equitable and reasonable rates, with the aim to prevent undue financial burdens on operators and, in turn, consumers.
8	Adopt best practice governance.	• Work with Ofcom to comply with specific technical requests regarding spectrum use. • Ensure operators strictly are not permitted to use any HRV equipment, which will be a mandated requirement in the future telecoms security policy letter published by the C*f*HA. • Encourage the use of shared network assets compatible with healthy competition. • Seek to ensure allocated spectrum is not used for any other any other purposes. • Modify licences with telecoms operators, as may be appropriate. • Work with Ofcom in order to meet monitoring, reporting and transparency requirements. • Seek to enable fair and reasonable, non-discriminatory access to the gigabit fibre network for mobile backhaul.

12 Licensing Conditions

12.1 The GCRA will modify telecoms licensing conditions taking into account the policy principles and objectives outlined above, in accordance with the powers conferred on it by the Regulation Law and the Telecoms Law which grants to the licensee a licence to establish, operate and maintain a Licensed Mobile Telecommunications Network and provide Licensed Mobile Telecommunications Services.

[45] States of Guernsey Cyber Security Strategy: https://www.gov.gg/CHttpHandler.ashx?id=111010&p=0

13 Consultation

13.1 The Committee has consulted with stakeholders to seek their views on the proposed policy approach. Consultation letters were sent from the Committee to the GCRA, Airtel, JT, Sure, the States of Alderney, Sark Chief Pleas, the Committee *for the* Environment & Infrastructure and the Development & Planning Authority.

13.2 In summary, all consultees support the ambition to deliver next generation mobile technology to the Bailiwick and support the Tech Neutral approach to spectrum licensing. Questions and comments from consultees relating to specific parts of the draft policy letter have been addressed in this final version.

13.3 A copy of the consultation response from the GCRA can be seen in full in **Appendix 7**.

14 Conclusion

14.1 Spectrum is a limited resource and increasingly in demand from the market. Radio spectrum is used not only for wireless communication, but also to support growth and innovation across all industry sectors, e.g. supporting public services and monitoring the natural environment. In the face of growing and competing demands for radio spectrum, the Committee is committed to ensuring that spectrum is allocated to best meet the economic needs of the Bailiwick.

14.2 The Committee is of the view that that deploying 5G and successive technologies will have the potential to transform the socio-economic landscape of the Bailiwick, meeting the Committee's strategic objectives to accelerate the digital economy and deliver next generation digital infrastructure. For clarity, the Committee is **not** currently recommending mandating a single island wide 5G network as part of this policy.

14.3 Managing the efficient and optimal use of spectrum allocation across the Bailiwick is critical. A notable policy objective is to manage spectrum allocation in line with Redsky's recommendations for spectrum optimisation and spectrum defragmentation (**Appendix 2, pages 15-16**) and to adopt a Tech Neutral approach to spectrum licensing. The progressive Tech Neutral approach offers an incredible opportunity to the Bailiwick as it's an innovative, flexible and forward-looking approach to spectrum management – a real economic enabler.

14.4 The Committee has worked closely with the GCRA to develop this policy letter and would like to express its gratitude to the GCRA team. The Committee would also like to take this opportunity to thank the consultees for reviewing the draft policy letter and responding with feedback.

14.5 The policy principles and objectives in **Section 11** have been drafted to support the Committee's strategic objectives, whilst minimising the impact on the environment, human health, safety and security.

14.6 In accordance with section 3(1A) of the Regulation Law[46], the States may, on the recommendation of the Committee and after consultation with the GCRA, give strategic or general directions to the GCRA concerning the priorities it should take into account in the exercise of its functions and powers under the Regulation Law.

14.7 The Committee is therefore asking the States:

1. To endorse the policy principles and objectives outlined in Section 11.

2. To direct the GCRA to develop and implement a spectrum licensing framework to deploy 5G and successive technologies to the Bailiwick taking into account the policy principles and objectives endorsed in proposition 1.

3. To direct the GCRA to report to the Committee on how it has exercised its functions and powers in accordance with the States Directions in proposition 2 in its Annual Report & Accounts.

15 Next Steps

15.1 Subject to the States decision the GCRA will develop and implement a spectrum licensing framework to deploy 5G and successive technologies to the Bailiwick by refarming existing licences and managing the process of any specific additional spectrum requests for individual use cases.

15.2 The GCRA has already issued a consultation (**Section 10.9**) which includes a proposal to modernise telecoms licences in several ways (**Section 10.8**). Subject to the consultation responses, the GCRA will modify existing licences so that they are Tech Neutral by the end of Q1 2025.

15.3 Operators can then decide on whether or not their existing spectrum allocations are sufficient to deliver their technological developments, upgrades and deployments beyond their current offering (i.e. 5G). Should operators consider that they require additional spectrum then, they can discuss additional allocations with the GCRA and submit an application for additional spectrum based on a demonstratable use case.

[46] The Regulation of Utilities (Bailiwick of Guernsey) Law, 2001 ("**Regulation Law**"). Available from: https://www.gcra.gg/media/er4fvdym/the-regulation-of-utilities-bailiwick-of-guernsey-law-2001-consolidated.pdf

15.4 If operators apply for additional spectrum, the standard process for spectrum licensing (**Section 6**) will apply. Providing there is no oversubscription, the spectrum award process can be between 3-6 months depending on the amount and complexity of what is required.[47]

15.5 Proposition 3 directs the GCRA to report to the Committee on how it takes into account the policy principles and objectives (**Section 11**) when developing and implementing a spectrum licensing framework to deploy 5G and successive technologies to the Bailiwick. The GCRA will include this reporting in its Annual Report & Accounts.

15.6 Delivering an "enabling digital infrastructure" is a prioritised Committee workstream in the current GWP. The Committee will therefore review the spectrum policy on a regular periodical basis to ensure that opportunities and risks arising from technological developments are reflected in policy.

16 Compliance with Rule 4

16.1 Rule 4 of the Rules of Procedure of the States of Deliberation and their Committees sets out the information which must be included in, or appended to, motions laid before the States.

16.2 In accordance with Rule 4(1):

a) The propositions contribute to the States' objectives to accelerate the digital economy – a vital economic enabler – by enabling digital infrastructure, one of the Committee's workstreams published in the 2023-25 GWP.

b) In preparing the propositions, consultation has been undertaken with the GCRA, the Committee *for the* Environment & Infrastructure, the Development & Planning Authority, Airtel, JT, Sure, the States of Alderney, and Sark Chief Pleas.

c) The propositions have been submitted to His Majesty's Procureur for advice on any legal or constitutional implications.

d) There are no financial implications to the States of carrying the proposal into effect.

[47] If there is over subscription for a given spectrum then a competitive process may be required, and the timescales are contingent on what form of competitive process is required to break the deadlock and meet legal standards.

16.3 In accordance with Rule 4(2):

a) The propositions relate to the duties of the Committee *for* Economic Development to advise the States and to develop and implement policies on matters relating to its purpose, which is to secure prosperity through the generation of wealth and the creation of the greatest number and widest range of employment opportunities possible by promoting and developing business, commerce and industry in all sectors of the economy.

b) The propositions have the unanimous support of the Committee.

Yours faithfully

N R Inder
President

S J Falla
Vice-President

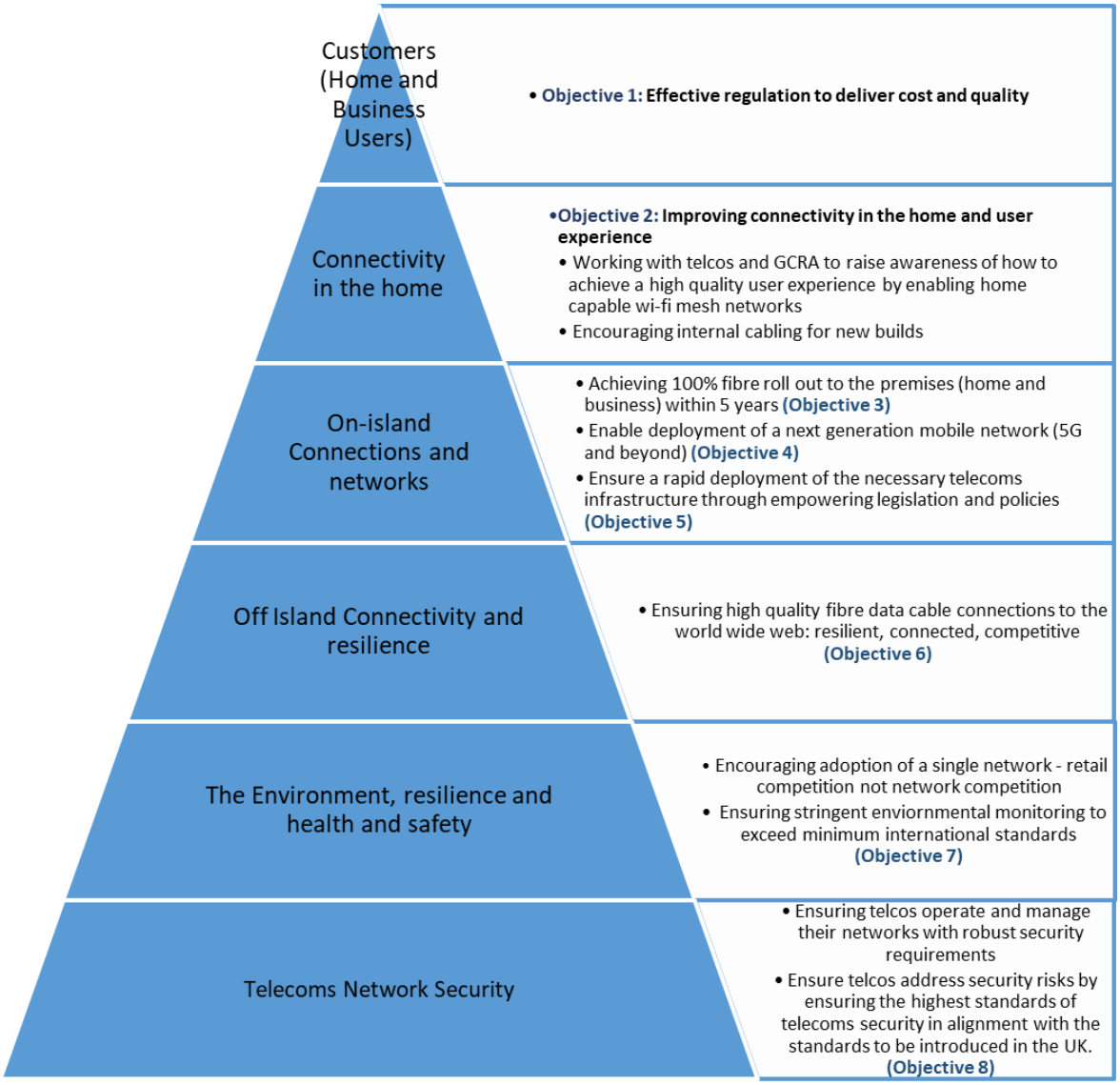
N G Moakes
A Kazantseva-Miller
S P J Vermeulen

A Mancini
A Niles
Non-States Members

APPENDIX 1: SUMMARY OF POLICY INTERVENTIONS AND ACTIONS FROM DELIVERING NEXT GENERATION DIGITAL INFRASTRUCTURE POLICY LETTER, 2021

KEY OBJECTIVE: To ensure the Bailiwick of Guernsey is one of the most digitally connected jurisdictions in the world where society, culture and the economy can leverage, and maximise, the opportunities of the digital age whilst ensuring maintenance and protection of the environment.

To achieve this key objective several policy interventions are required at all points of the connectivity journey – from off-island cables to maximising connectivity in the home. These are set out in summary below and in more detail through a series of summary tables.



ACTIONS TO DELIVER OBJECTIVES

1. <u>Customers (Home and Business Users)</u>

OBJECTIVE 1: Effective regulation to deliver cost and quality
This objective will ensure that the experience of home and business users when they use telecommunication services meets cost and quality expectations for the level of service purchased. This will continue to be an important part of the work of the GCRA.

ACTIONS:

- Continue to work with GCRA to ensure delivery of high-quality telecommunication services ***Responsible Committee: CfED***

2. <u>Connectivity in the home</u>

OBJECTIVE 2: Improving connectivity in the home and user experience
Although the States of Guernsey will not mandate which connection speeds users subscribe to, government should consider ways of enabling better connectivity by identifying opportunities to improve fixed wiring in homes or delivering modern wi-fi networks (e.g. Mesh networks) in new builds, and working with telcos and the GCRA to raise awareness of best practice to maximise connectivity in the home.

ACTIONS

- Work with GCRA to ensure that telcos deliver the expected and advertised user experience standards.
  Responsible Committee: CfED.
- Work with GCRA, telcos and other bodies to enable access to, and reasonable cost of, enhanced accessibility within the home ***Responsible Committee: CfED.***

3. <u>On-island connections and networks</u>

Fibre to the home
OBJECTIVE 3: Achieve 99+% fibre to the premises within 5 years
This objective will ensure accelerated roll out of fibre connectivity to all premises. Fibre connectivity ensures the best 'future-proof' solution for fixed data and voice connections.

ACTIONS:

- Work with telco provider(s) to achieve a rapid programme for fibre roll-out to ensure all premises are connected to fibre within 5 years (end of 2026)
  Responsible Committee: P&RC and CfED
- Work towards creating a single regulated network infrastructure – GCRA to ensure retail competition not network competition
  Responsible Committee: CfED

- Agree mechanism for possible States investment which may be required where this is of most benefit to the economy and the community to achieve an accelerated roll-out.
  Responsible Committee: P&RC

Telecoms infrastructure enablement through enabling legislation
OBJECTIVE 5: Explore and implement enabling legislation to allow rapid deployment of enhanced telecoms networks:
This objective deals with the States legislation and processes which will need to be eased or temporarily suspended to allow rapid deployment of infrastructure.

ACTIONS:

- Investigate the need to amend existing or implement enabling legislation in order to allow the rapid deployment telecoms infrastructure (Fibre and 5G). This may include, inter alia, the need to suspend road embargoes, and enable wayleaves.
  Responsible Committee: E&I / STSB/ P&RC
  Continue to review and adapt planning policy to encourage the rapid rollout and densification of the 5G network.
  Responsible Committee: E&I
- Investigate ways in which the States of Guernsey should take a role in the commercial aspects of the future 5G network. (Note: The States of Guernsey, either directly or indirectly, owns a range of transmitter sites, street furniture, buildings, underground ducts and off-island cables. In addition to direct funding, as identified in the Medium-Term Financial Plan, these physical assets may be made available to accelerate the delivery of a 5G network. This may include the purchase/lease of new telecommunications infrastructure subject to a commercial business case being made.)
  Responsible Committee: P&RC

Next generation mobile network (5G)
OBJECTIVE 4: Delivering a next generation mobile network (5G and its successors)
This objective will ensure the delivery of a 'next generation' (5G) mobile network. Mobile networks will be essential for Internet of Things (IoT) applications and devices that operate away from a fixed network (home or office) environment. The optimum solution is a single 5G network – due to economic and environmental considerations.

ACTIONS:

- Conclude a tender process through the GCRA to build and operate a (preferably) single 5G network (Mobile National Network "MNN")
  Responsible Committee: CfED
- Ensure the criteria for the 5G network licence provide connectivity to meet the current and future needs of the Island and encourage multiple service providers to offer services using the MNN
  Responsible Committee: CfED
- Ensure steps to develop a single network sharing architecture to enable transition from 4G legacy services to a 5G single network

Responsible Committee: CfED

- Ensure 5G network licence will promote and facilitate retail competition, not network competition

  Responsible Committee: CfED
- 5G Backhaul - GCRA to ensure the regulation of the interconnect cost of fibre backhaul to 5G transmitter sites. In this way no existing fibre operator can extract a commercial advantage when it comes to rolling out 5G to areas where fibre is scarce.

  Responsible Committee: CfED
- 5G Spectrum - GCRA to consider the availability of spectrum with the obligation to develop a single network and to ensure sufficient spectrum is available.

  Responsible Committee: CfED
- Licence conditions to be set to ensure maintenance and protection of the environment:
  - Exceed minimum health and safety standards
  - Minimise mast proliferation

  Responsible Committee: CfED

4. <u>Off-island connectivity and resilience</u>

OBJECTIVE 6: Maintaining off-island connectivity and resilience

Off-island connectivity is the lifeblood of a truly connected society and key to economic growth. Driving digital sector growth, one of the key elements of government policy, can only be achieved if connectivity is available, affordable, reliable and competitive with other jurisdictions.

ACTIONS:

- Work with telcos and the GCRA to review off-island connectivity and capability, ensuring that this connectivity is competitive

  Responsible Committee: P&R and CfED

  Investigate future opportunities for States of Guernsey investment with a suitable partner to provide additional/new cable capacity (when life expired) with a modern cable system, opening up new capacity and encouraging new business models.

  Responsible Committee: P&R and CfED

  Investigate strategic links to the internet back-bone, including point of presence on island.

  Responsible Committee: P&R and CfED

5. <u>The environment, resilience and health and safety</u>

OBJECTIVE 7: Ensuring protection of the environment and health and safety

This objective ensures that the benefits of an enhanced digital infrastructure are delivered whilst ensuring the maintenance and protection of the environment, and the safety of users at the same time as ensuring the resilience of data connectivity.

ACTIONS:

- Implement policies to deliver single shared networks to minimise duplication of resources and inefficient delivery of services

  Responsible Committee: CfED

- Encourage single 5G network to minimise mast proliferation and equipment on the masts
  Responsible Committee: CfED
- Ensure licence conditions are set to ensure that mast emissions must not exceed minimum international Health and Safety standards.
  Responsible Committee: CfED
- Ensure regular monitoring and reporting of mast emissions through the GCRA
  Responsible Committee: CfED
- Work with the GCRA to ensure that the telecoms network is resilient, secure and future proofed – achieved through licence conditions.
  Responsible Committee: CfED

6. Telecoms network security

OBJECTIVE 8: Ensuring network security and secure operational practices

This objective will ensure that telcos operate their networks and manage their supply chains in accordance with robust security requirements, and addresses the security risk posed by suppliers, in particular, high risk vendors. These security requirements will ensure the highest standard of telecoms security, in alignment with standards to be introduced in the UK.

ACTIONS

- Develop and introduce Bailiwick Telecoms Security Requirements (TSR) and ensure alignment with the UK TSRs.
  Responsible Committee: CfHA
- Develop and introduce guidance and legislation to ensure that telecoms operators, overseen by the GCRA and Government, design, manage and operate their networks to meet the new security requirements.
  Responsible Committee: CfHA
- Ensure alignment of telco security requirements across the Crown Dependencies to ensure parity and consistency of approach.
  Responsible Committee: CfHA
- Ensure that changes required by the TSR are implemented by the agreed timeframes.
  Responsible Committee: CfHA

States of Guernsey

5G Strategy

A Comprehensive Guide to the Next-Generation Mobile Technology

V5 - final version
October 3rd 2023
Ian Campbell

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Executive Summary

This comprehensive report delves deep into the subject of 5G, a next-generation digital communication technology and its relevance and significance to the States of Guernsey (SoG).

The overarching aim is to equip Guernsey with the knowledge and means to transition smoothly from the prevalent 3G/4G mobile infrastructure to the more advanced 5G technology, ensuring the Island maintains its competitive edge in the digital realm.

The SoG's digital aspirations pivot on several central themes:

- Catalysing the growth of the digital sector.
- Ensuring affordable yet cutting-edge digital infrastructure.
- Investing in a digital-savvy workforce ready to confront future challenges.
- Pledging universal and high-speed internet access through a variety of platforms, including fibre, local wireless and satellite technologies.
- Prioritising the safety and well-being of its inhabitants.

5G is not just a technology upgrade. For the SoG, it is an opportunity to redefine its standing on the global digital map. A robust digital framework is the bedrock of economic growth and innovation, offering mobility in business, creating disruptive business models and unlocking new commercial prospects.

Beyond business, 5G also enriches personal lives, enhancing communication and offers access to an array of services that have become indispensable in modern life.

The content of the report can be summarised under three primary sections:

1. Contextualising 5G for Guernsey:
    - Societal enhancements 5G can usher in.
    - Improved community services, like mobile health (mHealth).
    - The boon for local businesses and budding start-ups.
    - The advantage for remote workers, considering the emerging remote work trends.
    - The burgeoning 'digital nomad' community and its reliance on superior digital infrastructure.
    - Broader economic dividends of a well-connected society.

2. The Intricacies of 5G Licensing:
    - Breakdown of licensing components.
    - Comparative analysis of the licensing process in the UK/EU.
    - Hypothetical licensing processes for Guernsey.
    - A tailored licensing approach suited to Guernsey.
    - Considerations related to spectrum usage.
    - Key licensing milestones.
    - A recommended licensing strategy.

3. Health, Safety and 5G:
    - Standards for exposure and adherence.
    - Implications based on location and proximity to 5G infrastructure.
    - Upkeep and surveillance of 5G apparatus.
    - A strategy for informing and educating the public about 5G's health implications. Please see the separate document *'Understanding 5G Radio Signals: Health Concerns, Scientific Perspectives and the Role of Misinformation'*

In summary, this report is a holistic guide for the States of Guernsey, offering insights, comparisons and actionable recommendations on how to seamlessly usher in the 5G era, balancing technological prowess with the well-being and safety of its citizens.

Context- what is 5G?

5G stands for the fifth generation of wireless communications technologies supporting cellular data networks. It is a successor to 4G (LTE/WiMax), 3G and 2G systems.

5G enhancements vs 4G/3G:

1. Faster Speeds: 5G promises much higher data rates, with potential speeds of up to 10 Gbps for some specialist applications. More likely speed will be around 150- 250Mbs for the average user in Guernsey. Currently, in the UK 5G download speeds are in the region of 100/150Mbs and will increase in speed as and when the UK telecoms operators choose to upgrade their telecommunications equipment.

   To put 150Mbs into context, imagine you want to download a 2-hour HD film, which is about 6Gb in size. If you were using a typical 4G network with a speed of around 40Mbps, it would take you approximately 3 minutes to download the entire film. However, if you switch to an average 5G network, which can have speeds of up to 150Mbps or more, that same film could be on your device in just 40 seconds or even less. It is a stark difference that highlights the faster capabilities of 5G compared to 4G.

   While the enhanced speed of 5G technology dramatically reduces download times for media like films, its significance extends far beyond that. 5G is poised to revolutionise a multitude of sectors, facilitating innovations in areas like autonomous vehicles, telemedicine, augmented and virtual reality and smart cities. It offers reliable low-latency communication (Low latency communication means that data or information is transmitted quickly with very little delay. For example, having a conversation where the response is almost instant), enabling real-time applications that were previously unattainable with 4G.

   Moreover, 5G supports a more extensive network capacity, accommodating the rapidly growing number of internet-connected devices in our homes, towns and cities. In essence, while the swift film downloads might grab headlines, the transformative potential of 5G for industries, economies, and everyday experience is the key factor with this technology.

2. Lower Latency: 5G aims to achieve a latency as low as 1 millisecond, which means near-instantaneous response times. This is particularly important for real-time applications like gaming, augmented reality, certain industrial applications and at some point, in the near future, driverless transportation.

3. Increased Capacity: 5G technology can support a larger number of connected devices than its predecessors. This is crucial for the Internet of Things (IoT), where many devices from smart appliances to sensors will be connected to the Internet. Already in Guernsey and within SoG there are many devices and systems connected by mobile. For example, Guernsey Water remote monitoring of water pump performance.

4. **Improved Flexibility:** 5G networks are designed to be more flexible and programmable. This is achieved through Network Function Virtualisation (NFV) and Software-Defined Networking (SDN), allowing the network to adapt to different needs.

5. **Enhanced Connectivity:** 5G provides more uniform, peak data rates and more consistent user experiences across the coverage area.

6. **Broadband Applications:** 5G will replace traditional wired broadband in some locations, providing fast internet without the need for physical cables.

7. **New Use Cases:** Because of its features, 5G opens the door to new applications and use cases, including autonomous vehicles, smart cities, and advanced augmented reality/virtual reality experiences.

The development and rollout of 5G involves the use of new spectrum and mobile base station transmission technologies, such as millimetre wave frequencies and advanced antenna technologies like Massive MIMO (Multiple Input, Multiple Output – as in many antennas working together on a cell tower, to send and receive data more efficiently and serve more users at once).

Think of it as a stadium with many gates, allowing more people to enter and exit at the same time, making everything faster and smoother. It is worth noting that the implementation of 5G is more than just a speed boost- it is a transformative upgrade that will affect various sectors from entertainment and communication to healthcare and urban planning.

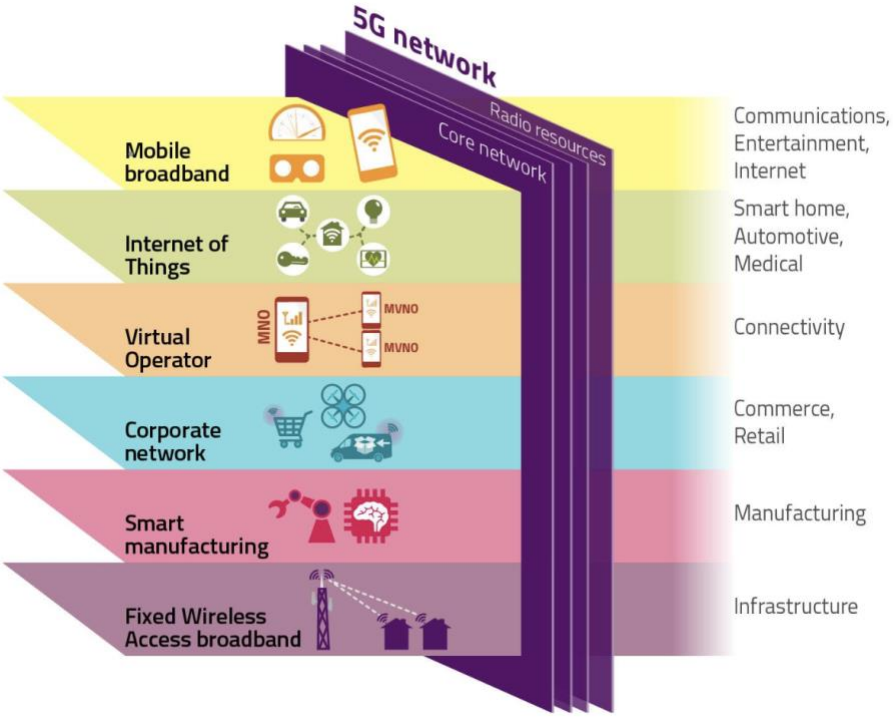


*Diagram source- Ofcom

For further information on the historical migration path to 5G, please see **Appendix 1.**

How will 5G evolve?

5G is available in most advanced economies today and is not a static technology as it is constantly evolving. The next iteration, known as 5G-Advanced, promises to revolutionise how we interact with the digital realm and will be available in late 2024. The technology allows seamless connections even while travelling at high speeds on planes or trains. This advanced network will cater to demands for swift uplinks, making it indispensable for high-mobility users.

The areas of entertainment, education, and training will see transformative changes as 5G-Advanced paves the way for highly interactive and immersive applications. This is not just about faster browsing; it is about changing the way we learn and experience the digital world.

Moreover, the evolution of 5G will enhance its compatibility with devices that are energy-efficient and cost-effective. Think of industrial sensors that can communicate more effectively, or wearable tech like smart glasses that offer more advanced features, all powered by a network that optimises their functionalities (see https://www.apple.com/apple-vision-pro/ to see where wearable tech currently stands).

The mobile innovation does not stop there. The industry is looking at enhanced support for drones, improved network synchronisation and even a fusion of terrestrial and satellite networks for seamless connectivity.

Starlink (https://www.starlink.com) and OneWeb (https://oneweb.net) are already on a mission to offer high-speed data 'backhaul' communication links to 5G base stations ('backhaul' is the transmission of data from a remote site or multiple sites to a central site). This approach aims to eliminate the need for expensive fibre connections in rural areas.

Herm, Sark and Alderney would be good examples of locations that will benefit from the fusion of terrestrial and satellite networks. Currently, data is delivered to these locations using backhaul microwave transmitters from Guernsey which are costly to maintain and limited in terms of capacity. It will be possible to connect the Bailiwick via satellite both as a backup to the existing undersea cables linking Guernsey to UK/France and an alternative backhaul method for the residents of Alderney, Sark and Herm.

While the current 5G infrastructure has already reshaped many aspects of personal and professional spheres, it is evident that its journey has only just begun. As 5G continues its march forward, it stands poised to redefine our understanding of connectivity and its impact on society.

6G, when does this come in?

Looking further forward, 6G networks may begin to be deployed by the late 2020s or early 2030s. While 6G's characteristics are unknown, Ofcom reports that it expects the technology to offer a range of new features, including far higher throughput, connectivity for many more devices in each area and improved latency which may enable an even greater range of applications. 6G may also make greater use of AI (artificial intelligence) and might use an even higher frequency spectrum, for example in the Terahertz range.

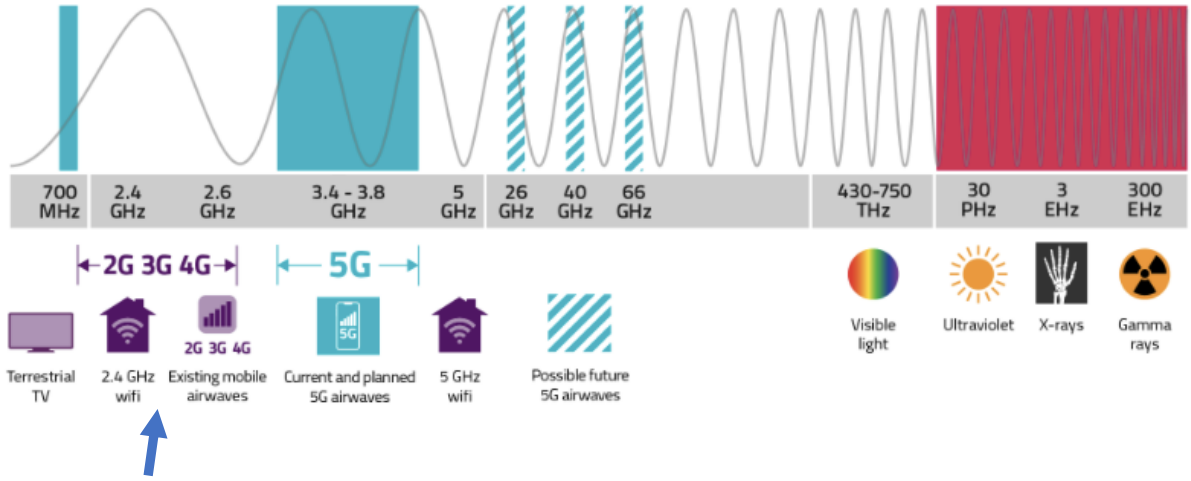
*Please see **Appendix 4** for further information on 6G.*

What are the essential Elements of a Mobile Network Infrastructure?

Spectrum

In mobile telecommunications, 'spectrum' refers to the invisible airwaves or radio frequencies that mobile networks use to transmit voice calls, texts and data. Think of it like lanes on a highway, where each lane represents a different frequency, allowing multiple conversations or data transfers to happen simultaneously without interference.

It is a finite resource and like any modern highway, it is under increasing threat of congestion. It is therefore important that Guernsey manages its spectrum to ensure future data-heavy services can service local demand.



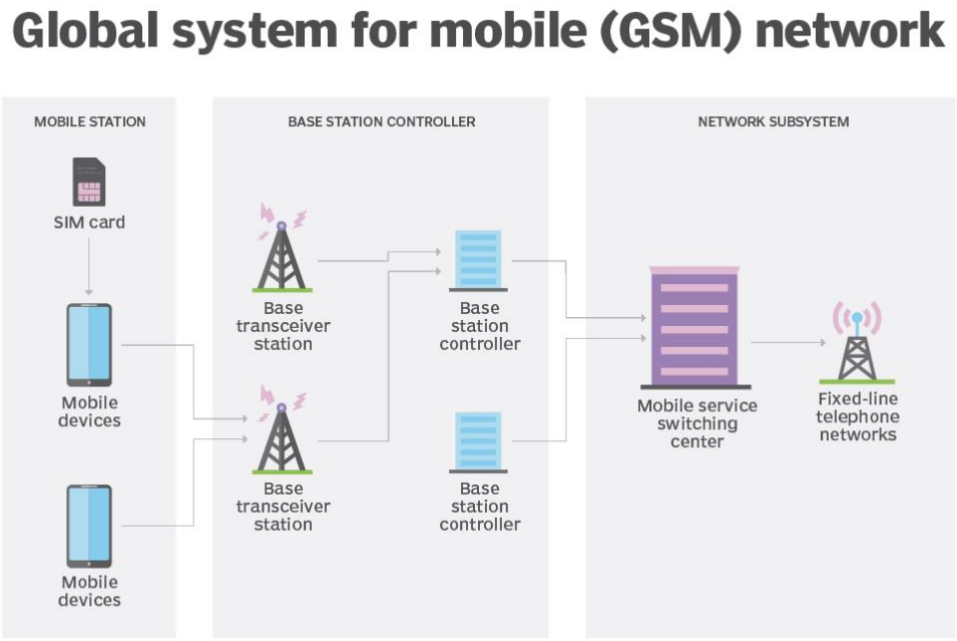
The spectrum diagram shows the position of mobile within the spectrum map and highlights that the available space for mobile spectrum is limited. New frequencies are essential for the effective operation of the 5G services and the report discusses this later.

Mobile network technical infrastructure

A mobile network is a complex system with several critical components ensuring seamless communication. At its core, the network relies on base stations or cell towers that transmit and receive signals to and from mobile devices.

These towers are connected to a central control system, known as the Mobile Switching Centre (MSC), which manages calls and text messages within each telecom business. e.g. Sure, JT and Airtel-Vodafone.

The MSC is linked to a gateway to facilitate connections to other networks, such as the Internet or landline phones.

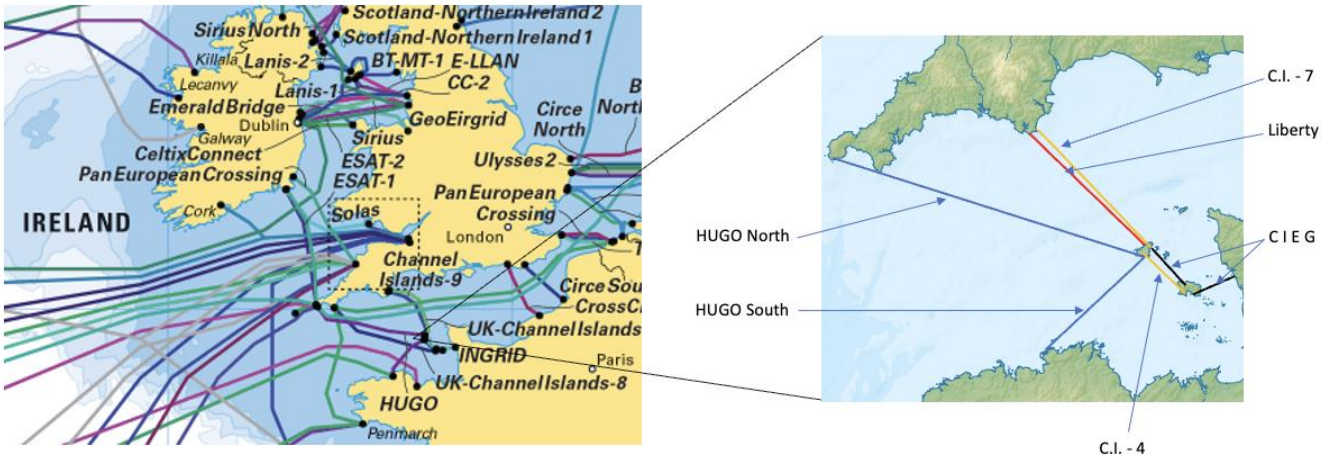


Additionally, the Radio Access Network (RAN) enables the transfer of data between the mobile device and the network.

Behind the scenes, there is a vast array of databases and servers, which store user information and provide the necessary security services.

In essence, these components work in tandem to facilitate the calls, texts and internet browsing we use daily.

Within the Bailiwick of Guernsey, we currently have three mobile networks with separate backhaul infrastructure to connect Guernsey to the UK and France via an extensive undersea fibre optic network, please see diagram below. The island has significant off-island capacity available for the next ten years or more. HUGO, CI 7 and 4 are near the end of life or at the end of life and recommendations on this are not covered in this report.



Why is 5G important to Guernsey?

While 5G is often seen as a luxury or 'nice-to-have' in many urban areas, for isolated regions like islands, it can be a game-changer in ensuring economic vitality, quality of life and global connectivity. Having a 5G service for Guernsey is critical for a number of reasons:

1. Economic Growth: As with many locations around the world, Guernsey can benefit from the potential economic growth 5G brings. By providing a faster and more reliable internet connection, local businesses can compete on a global scale, while also attracting foreign businesses and investments. It opens the door to new business models and innovative start-ups that rely on high-speed connectivity. 5G allows anytime, anyplace, flexible high-speed data connectivity.

2. Enhanced Connectivity for Residents and Tourists: For residents, 5G can significantly enhance day-to-day experiences, from smoother video calls to quicker downloads. Good connectivity for business or even leisure is often a crucial factor in deciding a travel destination. By offering 5G, Guernsey can position and advertise itself as a modern and appealing destination.

3. Digital Transformation: 5G plays a crucial role in driving digital transformation. With its superior speed and low latency, 5G can support the Internet of Things (IoT), enabling 'smart city solutions', from smart streetlights to efficient waste management systems. This will be essential for improving the quality of life and sustainability in Guernsey.

4. Remote Work and Digital Nomadism: The remote work trend has gained traction in recent years, accelerated further by global events like the COVID-19 pandemic. With 5G, Guernsey could attract remote workers or 'digital nomads' looking for a beautiful location with top-tier internet connectivity. The island requires a skilled younger workforce and could tap into this new smart nomadic work base of people who will not burden the island's healthcare or social services. European countries are actively promoting 'Digital nomad schemes' to attract temporary talent to their countries.

5. Healthcare Advancements: With telemedicine becoming increasingly popular, 5G can provide the necessary infrastructure for reliable telehealth services. This can be especially beneficial for island residents who might otherwise need to travel for specialist consultations.

6. Education Opportunities: Enhanced connectivity can facilitate better remote learning opportunities, access to global educational resources and smoother communication between educators and students.

7. Resilience and Redundancy: Being an island, Guernsey can be more vulnerable to disruptions in physical connections (like underwater cables). A robust 5G infrastructure can provide an additional layer of redundancy, ensuring consistent connectivity when combined with satellite services such as Starlink and OneWeb.

8. **Community and Safety:** In emergencies or significant events, having a reliable and fast communication network is essential for disseminating information and ensuring the safety of the community.

9. **Environmental Considerations:** 5G can help in monitoring and addressing environmental issues, from tracking wildlife to monitoring sea levels. For an island like Guernsey, which may have unique environmental considerations, this is vital.

10. **Enhancing Public Services:** Public services, from transportation to utilities, can be improved and optimised using data-driven solutions that rely on 5G's high-speed connectivity.

5G offers Guernsey avenues for economic development, improved quality of life and robust global connectivity.

5G licensing context and recommendations

3G/4G/5G Spectrum Licencing

Mobile Spectrum licensing refers to the regulatory process through which governments or regulatory bodies grant telecommunications providers the rights to use specific frequencies (or bands) of the electromagnetic spectrum to deploy their networks.

Spectrum- The Bailiwick of Guernsey Context

Licensing the spectrum in the Bailiwick of Guernsey is a critical procedure managed by the Guernsey Competition and Regulatory Authority (GCRA), with oversight from the States of Guernsey. This process allows selected telecommunications providers to access designated parts of the electromagnetic spectrum for 3G/4G, and soon-to-be, 5G rollouts. However, it is essential to note that all spectrum usage rights within the Bailiwick fall under the jurisdiction of Ofcom. As such, any spectrum allocation made by the GCRA must subsequently receive approval from Ofcom.

This procedure ensures the spectrum's judicious use, safeguards against disruptive interference, and promotes healthy competition. Recognising Guernsey's unique geographic and demographic challenges, the States of Guernsey and GCRA ensure that the spectrum is accessible to operators at equitable, reasonable rates. By not imposing exorbitant fees on the spectrum, the Bailiwick aims to prevent undue financial burdens on service providers and, by extension, consumers.

Such a strategy recognises the lack of economies of scale inherent to island communities and steers clear from indirectly imposing a telecommunications tax on its inhabitants as done in the UK and EU via highly inflated spectrum auctions (see https://www.ofcom.org.uk/spectrum/spectrum-management/spectrum-awards/700-mhz-and-3.6-3.8-ghz-auction)

Guernsey's 5G Spectrum: Government Recommendations

Below are recommendations to ensure Guernsey's successful transition to 5G technology. It is essential that our approach considers both the Island's unique attributes and broader global developments. The following recommendations offer a structured guide to integrating 5G effectively into our community and economy.

1. A Comprehensive Spectrum Strategy: Guernsey should consider adopting a strategic approach to spectrum management, prioritising cost-efficiency for both the GCRA and telecom operators. This strategy should be built upon a framework that offers a streamlined mechanism for licensing processes and ensures flexible spectrum access for a multitude of applications, both existing and forthcoming. A comprehensive spectrum plan, reflecting Guernsey's vision for a resilient 5G infrastructure, is paramount. Such a policy should encapsulate commitments to long-term licensing, seamless renewal procedures, and a transparent roadmap, ultimately fostering the most efficient and beneficial use of Guernsey's spectrum assets. The strategy could contain some of the following:

2. Government Approach on Pricing Dynamics: Guernsey's regulatory authorities should consider adopting a balanced approach to 5G spectrum pricing. Exorbitant pricing can hinder broadband speed and overall coverage. Transparent pricing models, devoid of inflated reserve costs or poorly designed auctions, are vital.

3. Licence Parameters: For the success of 5G in Guernsey, it is essential for the regulator to meticulously structure the terms, conditions and award methodologies for 5G spectrum licences. Engaging with the industry during this process will maximise 5G's benefits for the Island's residents and businesses.

4. Mid-Band Significance: The mid-band (between 1- 6Ghz) will be pivotal for ensuring robust Bailiwick-wide 5G coverage in Guernsey, Alderney, Sark and Herm, aligning with the Island's ambition to revolutionise sectors like financial services, education, tourism and urban planning through smart solutions. It is recommended to engage with local operators and 'system integrators' to establish possible mid-band requirements.

5. *High-Bands & mmWave: These bands offer unparalleled broadband speeds and minimal latencies over shorter distances and will be crucial for Guernsey in the future to truly harness the peak performance benefits of 5G technology. It is recommended that the regulator and industry understand the significance of these bands for Guernsey. Ofcom and GSMA provide good insight into these areas by providing educational material and webinars.

* High-Bands – range 6 GHz to 100 GHz. These bands transmit data at high speeds, providing substantial network capacity and enabling ultra-fast data transmissions. The trade-off is that high-band frequencies generally have a shorter range and are more susceptible to obstructions, such as buildings and atmospheric elements, which can limit their effective coverage.

* mmWave (Millimeter Wave) – Range 24 GHz to 100 GHz. mmWave technology is a key component in delivering ultra-fast 5G wireless broadband, offering the potential for multi-gigabit-per-second data rates.

6. International Harmonisation: It is crucial for GCRA to keep an eye on global spectrum standards and discussions, like the *WRC-23 process. Even though Ofcom controls our spectrum, by staying in the loop, Guernsey can make sure it is ready to use key parts of the spectrum effectively as they become available.

   *Note. The WRC-23 process refers to the preparations and discussions leading up to the World Radiocommunication Conference 2023 (WRC-23), organised by the International Telecommunication Union (ITU), where member countries will review and potentially revise international radio-frequency spectrum regulations to ensure efficient use and prevent interference.

7. Role of Spectrum Sharing: Given our distinct telecom environment, while sharing and unlicensed spectrums can support 5G development, they are best used as a supplementary measure. It is recommended that the GCRA take this into account and consider a policy on spectrum sharing.

8. Local vs. Public Spectrum Utilisation: Guernsey should avoid reserving specific frequencies solely for local or industry-specific purposes. Instead, the island would benefit from adopting flexible sharing methods, like leasing, to ensure broader public access to 5G services.

9. 5G Backhaul Needs: Considering Guernsey's unique geographical position, the regulatory approach should address local 5G backhaul requirements, encompassing both wireless and fixed solutions. Proper allocation and optimisation of spectrum bands are crucial, with a focus on cost-effective licensing. Additionally, it is important that the regulatory landscape remains flexible, serving current network operators while staying welcoming to possible newcomers in the future.

10. Spectrum Optimisation: Spectrum is a finite resource and 5G requires new as well as existing spectrum bands. It is therefore recommended that the States of Guernsey advise GCRA to embark on a process of housekeeping to optimise the Telecom industry's use of spectrum thus freeing up bands of spectrum for the island.

    It is recommended to go through this process first before awarding new spectrum thus ensuring the spectrum ranges are optimised for efficient use.

    Consideration should be given to the following:

Part I, Spectrum Optimisation

Context to consider. Two local operators (Sure and Airtel-Vodafone) may merge into one which has the potential to save spectrum. It is recommended that SoG consider conducting a full spectrum review to identify where efficiencies can be made. This can lead to better utilisation of the spectrum and reduced costs. Below are topic areas to consider as part of this review.

i. **Dynamic Spectrum Access (DSA):**
As part of the policy, we suggest encouraging operators to adopt technologies that provide flexible access to unused spectrum. This ensures that the spectrum is utilised only when necessary and remains available for others when not being used.

ii. **Advanced Antenna Techniques:**
Consider encouraging operators to consider the deployment of advanced antenna techniques such as Massive MIMO (Multiple Input, Multiple Output) to improve the efficiency of spectrum use. This can enhance the capacity without needing additional spectrum.

iii. **Network Densification:**
Encourage operators to consider increasing the density of cell sites, especially in urban areas. This allows for better frequency reuse and can cater to more users with the same spectrum. Planning support will be required to achieve this.

iv. **Optimise Core Network:**
Ensure local operators regularly update and optimise their core network infrastructure to handle data more efficiently, ensuring that the spectrum is used optimally.

v. **Regular Network Audits:**
GCRA carry out and to request that operators conduct regular audits of their local Guernsey networks to identify areas of underutilisation or overutilisation of the spectrum. This can provide insights into where efficiencies can be introduced.

Part II, Spectrum Defragmentation

This refers to the strategic reshuffling and reallocation of the Island's electromagnetic spectrum bands to ensure optimal utilisation and minimise inefficiencies. This initiative is akin to consolidating fragmented files on a computer system to boost its operational efficiency.

Ofcom example - https://www.ofcom.org.uk/consultations-and-statements/category-3/defragmentation-spectrum-holdings

i. **The Approach:** Guernsey's defragmentation process should involve a comprehensive review of current spectrum usage by consulting with the local telecommunications industry on bands used, utilisation and capacity and band requirements.

This can be followed by relocating the operator bands to free up larger, contiguous spectrum blocks. Such an approach would be overseen by the GCRA in consultation with

telecom operators. The process may identify instances of unused spectrum thus aiding to consolation process.

ii. Anticipated Benefits: By undertaking spectrum defragmentation, Guernsey will make more efficient use of its limited spectrum resources. This not only aids in bolstering the reliability and speed of wireless communications but also paves the way for next-generation technologies which will demand wider bandwidths.

iii. Potential Challenges: The defragmentation process may necessitate the relocation of existing spectrum and the local telecoms operators would be required to have the flexibility to work with the GCRA to achieve the spectrum efficacy goals for Guernsey. Spectrum is the lifeblood of any operator's business so there may be resistance to defragmentation.

11. Spectrum Auctions in Guernsey: Guernsey, like many jurisdictions, currently utilises competitive auctions as a method to grant spectrum licences, where telecom operators bid for usage rights of certain frequencies and bands. In the UK for example, this auction mechanism provides fiscal advantages to the UK Government and also ensures the most efficient allocation of spectrum to the UK operators capable of optimal utilisation.

    i. Stipulations of 5G Licences in Guernsey:
    As per the GCRA 3G and 4G licence bid format it is recommended the 5G licence in Guernsey should encompass the same explicit criteria. This encompasses obligations to provide coverage to a specified fraction of the Island's population within a designated timeframe and to achieve certain service quality benchmarks.

    ii. Spectrum Sharing:
    It is recommended that licences in Guernsey detail provisions regarding spectrum sharing, enabling roaming, or earmarking spectrum slices for niche operators or applications.

    iii. Licence Tenure and Subsequent Renewals:
    In Guernsey, spectrum licences are usually awarded for a defined duration, such as a span of 10-20 years. Post-expiry, licences might either undergo renewal or the spectrum could be slated for re-auction.

    iv. Spectrum Collaboration and Emergent Markets:
    It is recommended that the GCRA should consider permitting licence holders to sub-lease or collaborate on their spectrum rights, fostering an auxiliary market for spectrum utility.

    v. Pricing: Please refer to comments on page 13 ‘Government Approach on Pricing Dynamics’

Summary

Guernsey's advancement in the realm of mobile spectrum licensing reflects the Island's commitment to fostering a flexible and cost-effective telecommunications sector. The meticulous regulatory oversight by the GCRA and guided by SoG, combined with the necessary checks and balances from Ofcom will ensure a seamless transition from 3G and 4G to the much-anticipated 5G era.

Given Guernsey's unique geographical and demographic considerations, it is important that the Island's regulatory framework provides a level playing field for service providers. This not only facilitates a thriving commercial environment for current mobile operators but also paves the way for new market players.

As 5G becomes an imminent reality for Guernsey, the insights and directives provided in this report are instrumental in sculpting a future-ready telecommunication infrastructure. Through a blend of strategic foresight and tactical initiatives, Guernsey is poised to maximise its spectrum assets, ensuring its community benefits from the latest in connectivity advancements.

Appendix 1 – Spectrum bands OFCOM (UK)

OFCOM's UK's 5G spectrum, band allocations for 2021, 2022 and 2023.

Year	Frequency Bands Awarded/Licensed	Details
2018	2.3 GHz, 3.4 – 3.6 GHz	Licences awarded by auction
2019	1800 MHz, 2300 MHz, 3800-4200 MHz, 24.25 – 26.5 GHz	Shared access licences introduced for local wireless connectivity
2021	700 MHz, 3.6 – 3.8 GHz	More spectrum awarded
2022	900 MHz, 1800 MHz, 2100 MHz, 2.6 GHz	Licences updated for 5G deployment based on CEPT and EU decisions
2022	26 GHz, 40 GHz (mmWave)	Consultation for use in mobile technology, including 5G
2023	26 GHz	Statement on authorisation of the band and consultation on auction design

In 2018 and 2021, mobile network operators (MNOs) requested Ofcom to review and revise their licences in line with CEPT (European Conference of Postal and Telecommunications Administrations - coordinates telecommunication policies and regulations among European countries) and EU decisions to facilitate 5G deployment.

By September 2022, all mobile licensees received variations to their licences, allowing them to deploy 5G in the mentioned bands without further regulatory consent.

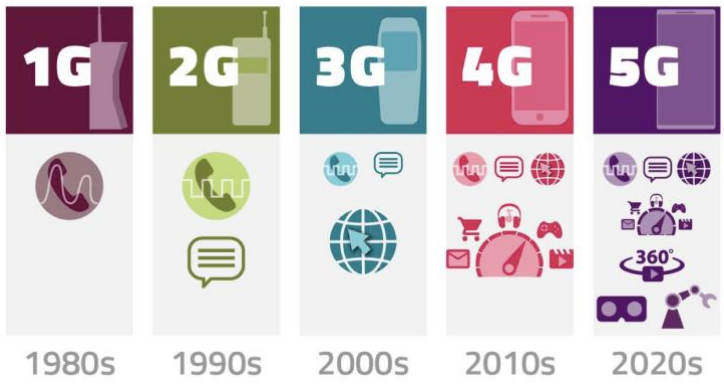
In 2019, Ofcom introduced a framework for the shared use of spectrum. Shared access licences are available in four frequency bands, supporting mobile technologies, including 5G, for both private and business use.

Local access licences provide short-term access to spectrum licensed to mobile operators, subject to availability in areas where services in the relevant spectrum have not yet been deployed by mobile operators.

In essence, 5G licensing is a critical regulatory tool ensuring that the radio waves, crucial for wireless communication, are used efficiently, fairly, and to the benefit of consumers and society at large.

Appendix 2 - History of mobile communication

Below is a brief history of mobile communications:



1G (First Generation)- 1980s:

The first generation of mobile networks, known as 1G, was introduced in the early 1980s. These were analogue voice-only systems and allowed for cellular calls but had limited capacity and were susceptible to eavesdropping.

2G (Second Generation)- Early 1990s:

Introduced in the early 1990s, 2G switched from analogue to digital.
It brought features like SMS (Short Message Service) and voicemail.
Examples include GSM (Global System for Mobile Communication) in Europe and CDMA (Code Division Multiple Access) in the US.

2.5G and 2.75G- Late 1990s to Early 2000s:

Before the full transition to 3G, these intermediary steps (like GPRS and EDGE) offered slightly faster data rates and introduced mobile internet browsing.

3G (Third Generation)- Early 2000s:

Introduced faster data transmission rates, allowing mobile phones to offer services like video calls and mobile broadband.
Technologies include UMTS (Universal Mobile Telecommunications System) and later HSPA (High-Speed Packet Access).

4G (Fourth Generation)- Late 2000s:

Started rolling out in major cities around 2009-2010.
LTE (Long-Term Evolution) became the dominant 4G technology, providing substantial speed improvements over 3G and supporting more applications like HD mobile TV, 3D TV, and video conferencing.

4.5G (LTE Advanced)- 2010s:

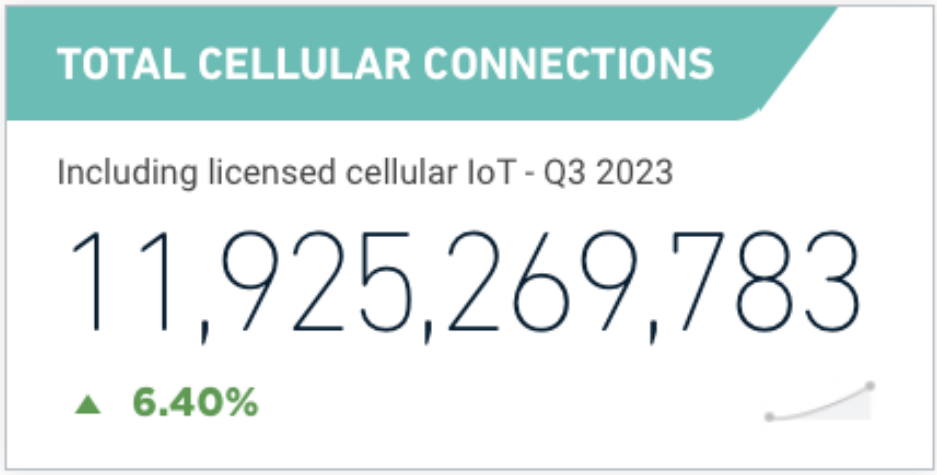
This was an improvement over standard 4G, offering even faster data rates and acting as a bridge toward 5G.

5G (Fifth Generation)- Late 2010s to Present:

- Focuses on higher speed, lower latency, and connecting a vast number of devices.
- Aims to support IoT (Internet of Things), autonomous vehicles, augmented reality/virtual reality, and more.

Throughout its evolution, mobile communication has transitioned from a luxury to a fundamental part of everyday life, reshaping how we communicate, work and entertain ourselves.

As of Q3 2023, the number of mobile users and connected devices stands at 11 billion and will continually increase year on year as we continue to connect more and more people and devices. The diagram below indicates where we stand globally regarding mobile connections:



Mobile data traffic has grown significantly over the last 10 years, from less than 500 MB (Megabytes) used per month per mobile device in 2013 to a total of monthly UK mobile data traffic in 2021 of 571.3 Petabytes (PB))- equivalent to 816 million hours of standard definition video streaming in the UK! Post-pandemic and with new 5G services in place it is estimated that mobile data traffic growth has increased by just over 20% in the UK since 2021.

* Source GSMA https://www.gsmaintelligence.com/data/

Appendix 3 - Spectrum

Spectrum, in the context of telecommunications and radio communications, refers to the range of electromagnetic radio frequencies used to transmit sound, data, and video across a country or around the world. It is an essential resource for any wireless communication, including TV and radio broadcasting, satellite systems and mobile cellular services.

Spectrum can be divided into:

1. Radio Frequencies (RF): These are frequencies within the electromagnetic spectrum associated with radio wave propagation. The RF spectrum ranges from about 20 kHz to 300 GHz.

2. Bands: Within this RF spectrum, specific ranges or 'bands' are allocated for different purposes. Each band has a designated purpose to avoid interference between services. For instance, FM radio operates in the VHF (Very High Frequency) band, Wi-Fi often operates in the 2.4 GHz or 5 GHz bands (frequencies) and different cellular services (like 4G or 5G) operate in other bands.

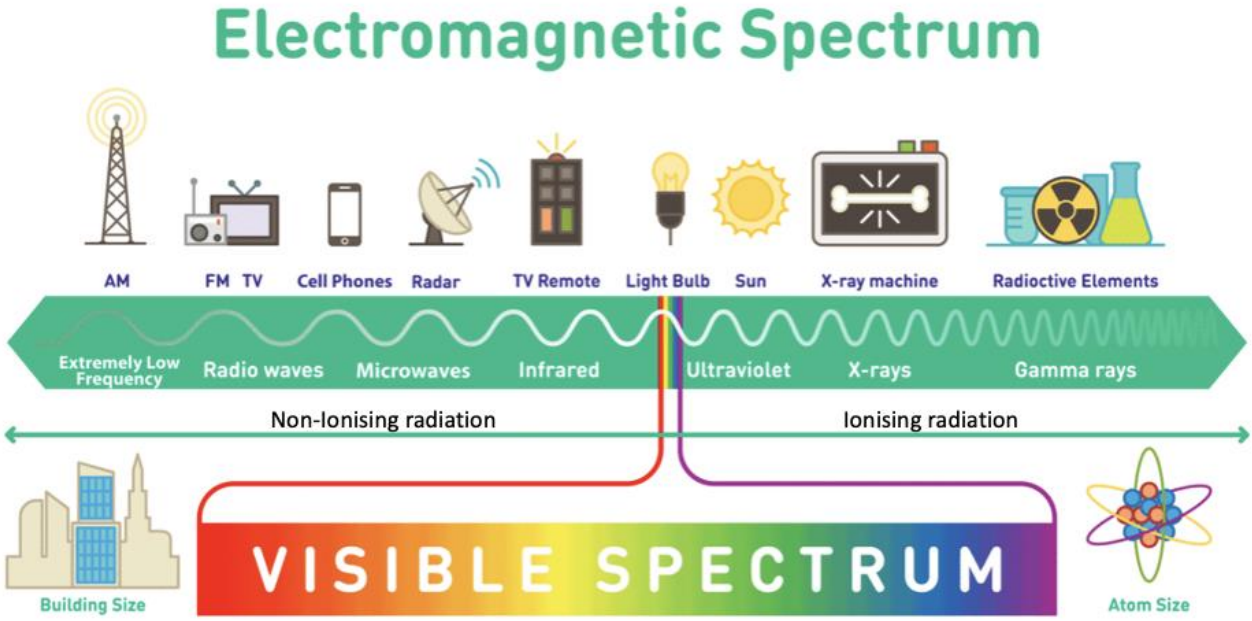
Frequency Bands Awarded/Licensed
2.3 GHz, 3.4 – 3.6 GHz
1800 MHz, 2300 MHz, 3800-4200 MHz, 24.25 – 26.5 GHz
700 MHz, 3.6 – 3.8 GHz
900 MHz, 1800 MHz, 2100 MHz, 2.6 GHz
26 GHz, 40 GHz (mmWave)
26 GHz

3. Propagation Characteristics: Different frequencies have different behaviours. For instance, lower frequencies can travel long distances and penetrate obstacles like buildings, making them valuable for many types of broadcasts. Higher frequencies, like those used for satellite communication or 5G cellular networks, have higher data capacity but may not travel as far or penetrate obstacles so well.

4. Regulation and Licensing: Because the spectrum is a limited resource and to avoid interference between services, governments around the world regulate and license its use. National regulatory authorities typically allocate specific bands for specific uses and then assign portions of those bands to specific users or entities, often through licensing processes or auctions. Our spectrum for Guernsey is regulated by GCRA but allocated by OFCOM.

5. Relevance in Modern Technology: As technology evolves, so does our use of the spectrum. The development and adoption of new wireless technologies like 5G often require rethinking and reallocating parts of the spectrum.

In a more general sense, "spectrum" can refer to *any range of frequencies or wavelengths, such as the visible light spectrum, which ranges from violet to red*. See diagram below:



Ofcom – spectrum policies

Ofcom, the Office of Communications, is the UK's regulatory authority for telecommunications, broadcasting, and postal industries. One of its primary responsibilities is the management of the radio spectrum. This is how Ofcom manages the spectrum:

1. Spectrum Allocation:
    - Ofcom follows both international and national frameworks to allocate various parts of the spectrum to different services, such as mobile communications, broadcasting, satellite services, and more.
    - International frameworks, like those set by the International Telecommunication Union (ITU), ensure harmonisation of spectrum use across countries, which is crucial for technologies like mobile communications.

2. Licensing:
    - Ofcom issues licences to entities, allowing them to use specific parts of the spectrum. This ensures that the spectrum is used efficiently and prevents interference between users.
    - Some parts of the spectrum are auctioned to the highest bidder, especially when the demand is high, like for mobile broadband frequencies.
    - Some licences are issued on a 'first come, first served' basis, while others might be granted without a fee for specific community or low-power uses.

3. Monitoring and Enforcement:
    - Ofcom monitors the use of the spectrum to ensure that it is being used in compliance with licences and to detect illegal or unlicensed use.
    - If interference occurs, or if entities do not comply with their licensing terms, Ofcom has the authority to take enforcement actions. This can range from fines to the revocation of licences.

4. Innovation and Research:
    - Ofcom supports and sometimes conducts research on emerging technologies that might affect spectrum use.
    - It considers future requirements and potential shifts in demand to ensure that the UK is prepared to adopt new wireless technologies.

5. Public Information:
    - Ofcom provides tools and publications to inform the public and industry about spectrum allocations, licensing, and other relevant matters.
    - This includes databases, maps and charts that show which frequencies are allocated for what purposes and who holds licences for various parts of the spectrum.

6. Spectrum Trading and Leasing:
    - To ensure flexible and efficient use of the spectrum, Ofcom allows licensees in certain bands to trade their spectrum rights or lease them to others. This can help entities quickly acquire spectrum when they need it and can lead to more efficient overall use.

7. Spectrum Release:
    - As technology and demand evolve, Ofcom sometimes 'releases' new parts of the spectrum for specific uses. This might involve reallocating frequencies from one use to another or making new frequencies available following technological advances.

Ofcom's approach aims to balance a variety of objectives, including ensuring efficient use of the spectrum, supporting innovation and economic growth, protecting consumers from interference, and maximising the benefits that wireless technologies bring to Society.

* Source - Ofcom https://www.ofcom.org.uk/phones-telecoms-and-internethttps://www.ofcom.org.uk/phones-telecoms-and-internet

GCRA – Ofcom and Spectrum

GCRA oversees competition and regulation within the Bailiwick of Guernsey. Its primary domains include postal services, telecommunications and competition law. Given the proximity and interconnections between the UK and the Channel Islands, there is a working relationship between GCRA and Ofcom, especially in the realm of telecommunications and broadcasting.

In summary, broadly this is how GCRA and Ofcom work together regarding spectrum:

1. Memorandum of Understanding (MoU): In various regulatory contexts, it is common for two regulatory bodies to have a Memorandum of Understanding, or MoU, that outlines how they will work together, share information, and coordinate on overlapping issues.

2. Consultation on Spectrum Management: Even though the Bailiwick of Guernsey manages its own spectrum rights locally, there is consultation with Ofcom to ensure that there is no harmful interference with services in the UK or France. Given that radio waves do not recognise political borders, coordination is essential.

3. Technical and Policy Coordination: GCRA consults with Ofcom when setting technical standards or policies to ensure it aligns well with those of the UK. This can be particularly relevant for technologies where interoperability is key, such as mobile telecommunications, television, radio and emergency services radio frequency transmission.

4. Sharing of Best Practices: Given Ofcom's larger size and scope, it has more resources to conduct research, analysis and policy development. GCRA draws on Ofcom's experience and expertise to inform its decision-making locally.

5. Licensing and Regulation of Broadcast Content: For broadcast content that is received in both the Bailiwick of Guernsey and the UK, there is coordination and consultation between GCRA and Ofcom to ensure consistent regulation and oversight.

6. Consumer Protection: In cases where consumers might use services from both jurisdictions (e.g., a mobile phone service from a UK provider while in Guernsey), there will be coordination between GCRA and Ofcom to address complaints, disputes, or issues related to service quality and fairness – albeit this would be rare.

7. Security: GCRA and Ofcom collaborate on telecommunications security issues like 'global title abuse' by sharing critical information, jointly developing guidelines, and coordinating responses to significant incidents. Their partnership encompasses joint training sessions, stakeholder engagement and industry awareness campaigns.

8. Engagement in International Forums: On some occasions, GCRA and Ofcom may coordinate or collaborate in international forums, like the International Telecommunication Union (ITU), especially if there is a common interest or if they are presenting a shared viewpoint or stance.

While GCRA and Ofcom are distinct entities with separate jurisdictions and responsibilities, the nature of telecommunications and broadcasting means that close coordination and cooperation can be beneficial for ensuring effective regulation and serving the interests of consumers and businesses in both the UK and the Bailiwick of Guernsey.

Appendix 4 - 6G Telecommunication Technology

1. Introduction of 6G

6G, is the future generation of mobile telecommunication technology and aims to further improve the performance plus efficiency of current networks. Given the growth of the Internet of Things (IoT), * industry 4.0, home automation and smart technologies, 6G promises lower latency rates and higher data transfer speeds, enabling seamless integration of artificial intelligence, automation and other advanced systems.

* Industry 4.0 refers to the fourth industrial revolution and encompasses the use of modern smart technology in manufacturing environments. It involves the employment of advanced technologies such as the Internet of Things (IoT), robotics, artificial intelligence (AI), and machine learning to create smarter, more efficient, and more automated manufacturing processes. Industry 4.0 emphasises the use of real-time data and connectivity to optimise various aspects of the manufacturing and supply chain process, enhancing productivity, efficiency, and creating more intelligent, adaptable manufacturing systems. Telsa makes good use of Industry 4 techniques within its car manufacturing plants.

2. Difference between 6G, 5G, and 4G

- 4G: Introduced as a game-changer, 4G focused on speed, enabling faster mobile browsing and making online activities, like video streaming, feasible on mobile devices.
- 5G: Beyond speed, 5G brings incredibly low latency and increased connectivity, paving the way for IoT devices, smart cities and autonomous vehicles.
- 6G: Building on the foundation of 5G, 6G is anticipated to offer even higher data transfer speeds, ultra-low latency, and advanced features like holography in communication, boosting IoT, blockchain, AI and more.

3. Economic Implications

Industry forecasts anticipate that the introduction and widespread adoption of 6G will yield numerous economic benefits in society:

- Job Creation: Infrastructure development, research, maintenance and the growth of new businesses aligned with 6G could lead to significant employment opportunities.
- Increased GDP: Enhanced productivity in industries due to faster and more reliable communication can boost economic output.
- Global Competitiveness: Being at the forefront of 6G can establish a country as a technology leader, attracting foreign investment and talent.
- Stimulated Innovation: Enhanced capabilities of 6G can spur innovations in various sectors, leading to the development of new business models and services.

4. Viability for Government Planning

Given the economic potential of 6G, governments in Singapore, South Korea, China and Japan are looking at the following:

- Immediate Term:
  Focusing on research, understanding global trends, and setting up dedicated teams or task forces for 6G preparedness.

- Short to Medium Term:
  Invest in infrastructure, foster partnerships with private players, offer tax incentives and

stimulate domestic research and development.

- Long Term:
  Rollout 6G services, constantly monitor, update as required and ensure that the advantages of 6G reach all sectors of the economy.

5. Recent Market Dynamics and Segmentation

The current 6G market is nascent but like previous generations it shows significant promise:

- Major Players:
  Apple, AT&T, Huawei, Nokia, Samsung, and more are all investing heavily in 6G.

- Segmentation:
  The market is diverse, with different segments focusing on consumer applications (like mobile and M2M communication), industrial applications (like Industry 4.0 and smart cities), product types, and materials.

- Geographical Landscape:
  While China is expected to lead, North America, Europe, and the Asia-Pacific region are all key players in the 6G race.

6. Challenges and Opportunities

While the promise of 6G is undeniable, the transition may be slowed by the existing infrastructure and device limitations. However, the growth potential in areas like IoT, blockchain and AI offers unparalleled opportunities for early adopters.

7. Value Addition for Organisations

Organisations can benefit from this report in terms of:

- Product Strategy:
  Understanding applications and market demands for 6G can guide product development.

- Growth Strategy:
  Identifying market trends, potential collaborations and expansion opportunities will be crucial for businesses aiming to capitalise on 6G.

Summary

6G represents not just the next step in telecommunications but a revolutionary leap. Governments in Asia already recognise its potential and have started strategic planning thus ensuring that their nations will remain competitive in the global market.

It is worth noting that European, British and US governments are lagging Asia regarding planning and legislating for 6G.

Regarding Guernsey, it is worth tracking the technology, being aware of the spectrum challenges and monitor guidance from Ofcom.

Understanding 5G Radio Signals: Health Concerns, Scientific Perspectives and the Role of Misinformation

October 3rd 2023
v6 – Final version

Ian Campbell

In a world transitioning rapidly into a 5G era, the implications of this technology on human health are a paramount concern. This report seeks to enlighten, educate, and provide clarity on the subject from an informed and evidence-based standpoint.

Table of contents

5G Radio Transmission – Safety discussion

Executive Summary:

This report examines the concerns surrounding 5G radio signals and their potential impact on human health. Drawing on scientific research, expert opinions, and globally recognised health institutions, the aim of this report is to provide a clear and unbiased perspective on the matter, concluding with some recommended precautions for SOG and GCRA. Before delving into the report, it is important to take onboard the context below.

Context 1, Radio Waves - Nature, Science and History

Radio waves, a subset of electromagnetic radiation, have been an integral part of our environment long before the emergence of modern communication technologies. Both natural and man-made sources contribute to the radio wave spectrum that we are exposed to daily. Understanding this spectrum and the influence of distance on signal strength helps contextualise the potential effects of 5G radio waves.

1. Natural Radio Waves:

   Cosmic Background: The universe itself is a source of radio waves, known as cosmic background radiation. This remnant from the Big Bang bathes the Earth in a constant, low-level radio signal.

   Terrestrial Sources: Our very own planet emits natural low-frequency radio waves, primarily resulting from lightning storms and geomagnetic activity. These natural emissions are omnipresent and have been around since well before the advent of life.

2. A Century of Man-made Radio Signals:

   Early Beginnings: Man-made radio wave emissions began in earnest with the invention of the radio at the turn of the 20th century. Guglielmo Marconi's pioneering experiments in wireless telegraphy in the late 1890s laid the groundwork for what would become an explosion of radio communications, both in amplitude and frequency.

   Evolution of Communications: Over the last century, the use of radio waves has diversified immensely. From the AM and FM radio broadcasts to television signals, mobile communications (1G to the upcoming 5G), Wi-Fi and more, the airwaves have become increasingly populated with man-made signals.

3. Power and Distance:

   One of the fundamental principles of physics related to radio wave emissions is the ‘inverse square law’.

   This law states that the power density of an electromagnetic wave is inversely proportional to the square of the distance from the source. In simpler terms, as you move away from a radio transmitter, the power of the radio wave decreases exponentially. For instance, doubling your distance from a transmitter will reduce your exposure to only a quarter of its original strength.

5G and Signal Strength: Taking the inverse square law into account, concerns about 5G often overlook the fact that many transmitters, especially those close to residential areas, operate at low power levels. Moreover, the higher frequencies used in 5G have a shorter range, which is why there will be a need for more base stations. However, these stations will generally operate at even lower power levels than their predecessors.

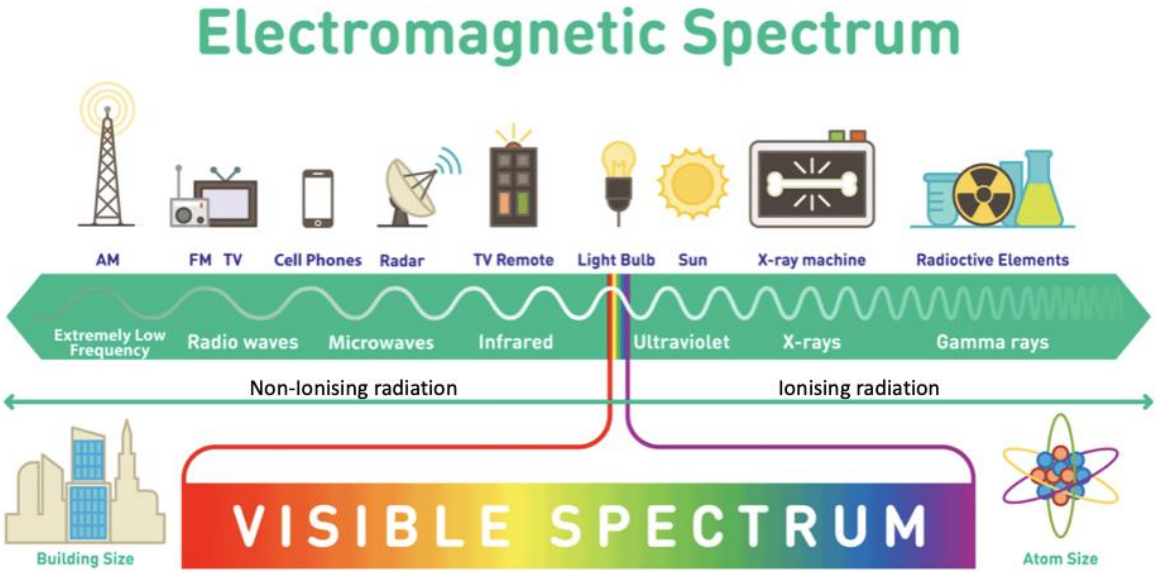
When considering the impact of 5G radio waves in this report, it is important to recognise them as part of a broader spectrum of both man-made and natural radio emissions that have surrounded us for aeons. While 5G is a newer technology, the principles governing its radio emissions, including the rapid decrease in power with distance, are well understood. It is this context, grounded in over a century of radio communications and the timeless presence of natural radio waves, that provides a balanced perspective on the technology's place in our environment.

Context 2 – Understanding Radio Waves in the Spectrum Map: Ionising vs. Non-Ionising Radiation

The electromagnetic spectrum encompasses a vast range of electromagnetic waves, varying in frequency and energy. These waves range from very low-energy radio waves to very high-energy gamma rays. A crucial distinction within this spectrum is the difference between ionising and non-ionising radiation, which has implications for the potential biological effects of these waves.

Radio Waves and their position in the Spectrum:

Radio waves are located at the low-frequency end of the electromagnetic spectrum. They have longer wavelengths and lower energy compared to other types of electromagnetic waves. Due to their low energy, radio waves are classified as non-ionising radiation. See diagram below:



Ionising vs. Non-Ionising Radiation:

1. Ionising Radiation:
    - Definition: Ionising radiation has enough energy to remove tightly bound electrons from atoms, leading to the formation of ions.
    - Effects: Due to its high energy, ionising radiation can cause damage to the DNA within cells, potentially leading to mutations and an increased risk of cancer.
    - Examples: X-rays, gamma rays and some ultraviolet (UV) light are examples of ionising radiation.

2. Non-Ionising Radiation:
    - Definition: Non-ionising radiation lacks the energy to remove electrons from atoms. Instead, it can cause atoms and molecules to vibrate or rotate.
    - Effects: While non-ionising radiation does not have the energy to damage DNA directly, it can cause heating effects. For instance, microwave radiation can heat water molecules, which is the principle behind microwave ovens.
    - Examples: Radio waves, microwaves, and visible light are examples of non-ionising radiation.

Context 3 – The Weaponisation of Misinformation

Information warfare, sometimes called the "war of narratives," has been an age-old strategy but in the age of the internet and social media, its potential reach and impact have grown significantly. By manipulating information, states can pursue their strategic goals without resorting to traditional warfare. In the context of 5G health concerns, some governments, notably Russia and North Korea, have been accused of propagating or supporting the spread of misinformation. But why would these nations engage in such activities, especially concerning a technological innovation like 5G?

1. Distraction and Disruption:

    Creating or amplifying concerns around the health implications of 5G can serve to distract or disrupt the populations and governments of adversary nations. This distraction could delay the rollout of 5G in these countries, potentially giving the instigating nation a technological or economic edge.

2. Undermining Trust:

    Spreading fear, uncertainty and doubt can erode public trust in Western institutions, science, and governments. If the population believes that their government is hiding the ‘truth’ about 5G health risks, it can create divisions and erode faith in elected officials or scientific bodies.

3. Economic Impact:

    Hesitation to adopt or invest in 5G due to health fears can have economic ramifications. Slowing down 5G implementation can affect various sectors, from telecommunications to IoT (Internet of Things), thus hindering economic growth in countries targeted by the misinformation campaigns.

4. Fuelling Protests and Civil Unrest:

   By amplifying the narrative of health concerns related to 5G, states can indirectly fuel protests, leading to civil unrest. Such disturbances can drain resources, divert political focus and act as destabilising factors.

5. Reinforcing their own Narrative:

   Countries like Russia have their own concerns about the West's technological dominance. By portraying Western technological advances like 5G as potentially harmful or dangerous, they can justify their own policies or technological paths that may differ from global trends.

6. A Proven Tactic:

   Misinformation campaigns have been successfully employed by these nations on various other fronts, from elections to public health crises. Using it as a tactic against 5G is a logical extension of their broader information warfare strategy.

In the world of geopolitics, technological advancements like 5G are not just tools for communication; they become pawns in a larger game of influence and power. For countries aiming to disrupt or challenge their adversaries, the spread of misinformation, especially in areas that can incite fear in the public, is a potent weapon.

Guernsey is not isolated from this information war; therefore it is important for local politicians, the media and the regulator to understand these tactics, their origins and their motivations. It is crucial to counter them effectively and ensure that public discourse is based on facts, not fabricated narratives derived from platforms such as TikTok, Facebook, Instagram etc.

Concerns Surrounding 5G Radio Signals:

There has been a growing apprehension regarding the health implications of 5G technology.

The main concerns include:

- *Potential Increased Radiation:* Some believe 5G technology will result in increased electromagnetic radiation exposure.
- *Possible Carcinogenic Effects:* A few studies on 2G and 3G networks hinted at an increased risk for tumours in animals, leading to concerns about 5G as well.
- *Symptoms like Fatigue and Dizziness:* Anecdotal reports of fatigue, dizziness and headaches near cell towers have contributed to concerns.

Origins of the Concerns:

- *Misinformation and Viral Posts:* As explained above, the spread of misinformation through social media platforms and conspiracy theories has considerably escalated fears since the pandemic occurred.
- *Past Research on Earlier Technologies:* Research on older mobile technologies, like 2G and 3G, has been extrapolated to 5G, even though they operate differently.

- *Lack of Understanding:* The technical nuances of 5G technology are not always easily understandable, leading to fear of the unknown.

What Science and the Medical Profession Say:

Nature of Radio Waves: 5G, like its predecessors, uses non-ionising radiation, which does not have the energy to ionise atoms or molecules. This means it can not directly damage the DNA inside cells, contrasting with ionising radiation from X-rays or UV rays from the sun which can.

Research Outcomes: According to extensive studies by organisations like the World Health Organisation (WHO) and the International Commission on Non-Ionising Radiation Protection (ICNIRP), exposure to electromagnetic fields at the frequencies used by mobile phones and their base stations does not produce any adverse health effects, provided they are below the internationally accepted guidelines.

Lack of Conclusive Evidence: No scientific evidence to date conclusively proves that 5G technology poses a risk to human health. The research thus far has found no significant health risks.

Precautions and Recommendations:

For SoG and GCRA, adopting a proactive approach is essential, both in setting guidelines for mobile operators and in educating the public and politicians. Below are industry standard recommended precautions:

- Safety Limits: It is recommended that GCRA ensures that all 5G technologies based within the Bailiwick adhere to internationally accepted exposure guidelines such as those provided by the 'International Non-Ionising Radiation Committee' (INIRC https://www.icnirp.org). It is worth noting that GCRA has in the past provided guidelines to local operators with regard to 3G and 4G.
- Regular Monitoring: GCRA should regularly check and ensure that 5G emission levels from cell towers and phones comply with OFCOM guidelines (again GCRA already carries out testing of 3G/4G base stations locally).
- Public Education: Should public concerns start to build locally on social media it may be necessary to launch awareness campaigns to educate the public on 5G technology, dispelling myths and promoting science-backed information. Such information campaigns can be difficult to manage on social media as these tend to be disrupted or hijacked by anonymous posters who seek to disrupt public debates in order to gain notoriety. These debates are better held in a public forum where people can speak freely.
- Precautionary Installation: While current evidence does not show harm from cell towers, placing them away from schools and hospitals can be a precautionary measure to alleviate public concern.
- Educate Politicians: Provide informational sessions for politicians to ensure that policy decisions are informed and evidence-based, not social media-based.

Summary:

Humans are constantly exposed to a spectrum of radiation, ranging from ionising, like X-rays, to non-ionising forms, such as those from mobile technologies. While ionising radiation has well-documented harmful effects, current evidence suggests that non-ionising radiation from mobile networks, when adhering to international guidelines, does not present a significant health threat.

As 5G technology progresses, a unified effort from governments, regulators, and the telecom sector is paramount in addressing apprehensions and ensuring its secure and effective implementation.

The primary concerns surrounding 5G often arise from misinformation or misconceptions. The prevailing scientific consensus, anchored in rigorous research, affirms that 5G, within established safety parameters, is safe.

Regulatory bodies like the GCRA (guided by local SoG policies) locally, remain instrumental in upholding these standards, ensuring consistent oversight and providing clear, fact-based information to both the public and decision-makers.

Appendix

Regulators and UK Government

1. GCRA mobile mast report - https://www.gcra.gg/cases/2021/2021-mast-audits/2021-mobile-mast-emissions-audit/
2. Ofcom EMF measurements near 5G mobile phone base stations - https://www.ofcom.org.uk/__data/assets/pdf_file/0021/214644/emf-test-summary-010321.pdf
- https://www.gov.uk/government/publications/mobile-phone-base-stations-and-health

Information warfare and its impact

1. https://www.cbinsights.com/research/future-of-information-warfare/
2. https://www.bbc.co.uk/news/uk-england-merseyside-52966950
3. https://www.bbc.co.uk/news/53191523

Cancer Organisations - Radiofrequency (RF) Radiation

1. https://www.cancer.org/cancer/cancer-causes/radiation-exposure/radiofrequency-radiation.html
2. https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet

General research

1. https://en.wikipedia.org/wiki/Non-ionizing_radiation
2. https://www.who.int/ionizing_radiation/chernobyl/backgrounder/en/
3. http://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf
4. https://www.who.int/news-room/questions-and-answers/item/radiation-5g-mobile-networks-and-health
5. https://www.icnirp.org

The Office of Environmental Health and Pollution Regulation

States of Guernsey Public Health Services

Human health and 5G technology:

An updated joint position statement from Public Health Services and the Office of Environmental Health & Pollution Regulation

In 2019, in anticipation of the possible introduction of 5G technology to Guernsey, staff working across Public Health Services and the Office of Environmental Health & Pollution Regulation examined the relevant regulatory mechanisms in place locally and reviewed published research from reputable sources to assess the likely effects of 5G on human and environmental health. This included a detailed review of specific concerns raised by individual correspondents during 2019.

In August 2024 we reviewed the available literature relating to 5G technology again and identified no new concerns. *Our review of 2019 indicated that there was insufficient evidence of adverse health or environmental effects of electromagnetic field (EMF) radiation connected to the use of 5G frequencies. In 2024 we found no new evidence that would change this view.*

All frequencies that are used currently, and will be used in the future for 5G, fall within the part of the electromagnetic spectrum that includes radiation which is classed as 'non-ionising'. This means that these radio waves do not carry enough energy to directly damage cells. This is different from 'ionising' radiation, which is generally considered to be hazardous to humans and includes gamma (nuclear) radiation as well as x-rays, which occur at the higher frequency end of the electromagnetic spectrum.

Public Health Services and the Office of Environmental Health & Pollution Regulation endorse the international guidelines for limiting exposure to radio waves, published by the International Commission for Non-Ionising Radiation Protection (ICNIRP). These guidelines cover many uses of radio frequencies, including Wi-Fi, Bluetooth and mobile technologies. The guidelines were updated in March 2020 and take full account of 5G operating at higher frequencies.

In relation to 5G, Public Health England (now the UK Health Security Agency) have said that "*the overall exposure is expected to remain low relative to guidelines and, as such, there should be no consequences for public health".*[1]

[1] https://www.gov.uk/government/publications/5g-technologies-radio-waves-and-health/5g-technologies-radio-waves-and-health

Furthermore, local monitoring and regulation of energy emissions from mobile telephone masts is currently carried out through the independent regulator, the Guernsey Competition and Regulatory Authority (GCRA). *We have checked the website of the GCRA and think it would be useful to confirm that robust monitoring, conforming to international standards, remains in place and will continue into the future.*

In summary, we could find no indication to impose tougher restrictions than are currently in place. However, this is a topic that we will continue to monitor and keep under review as new evidence emerges or as guidance is updated.

August 2024

APPENDIX 5: CICRA 2019 CONSULTATIONS

CICRA launched a consultation in May 2019 via the publication of "5G Spectrum: Draft Statement of Intent"[1] with the aim to ascertain the level and nature of demand for available spectrum in the Channel Islands. CICRA's proposal was developed to meet Jersey and Guernsey's respective government policies, the proposal being that Ofcom award 5G spectrum to one operator in Guernsey and one operator in Jersey, with other service providers gaining access to the single radio network through commercial agreement.

> "CICRA intends to recommend that Ofcom award 5G Spectrum (in the 700Mhz and 3.4-3.8GHz bands) to one operator in Jersey and one operator in Guernsey, which may be the same operator or a consortium of operators.
>
> New conditions will be included in operator(s) licence to operate a 5G network and provide services in Jersey and / or Guernsey.
>
> CICRA may then consider a recommendation that the remaining spectrum in these bands is issued to other operators after a period of exclusivity."

Respondents to the consultation included the largest Channel Island operators, JT[2] and Sure[3] who shared some concerns with the single operator proposal.

In November 2019, CICRA published an updated proposal in its final "5G Spectrum: Statement of Intent"[4], which was to allocate spectrum to multiple operators using an award process.

> "CICRA intends to recommend that Ofcom award 700 MHz and 3.4-3.8 GHz 5G spectrum in two stages.
>
> Stage 1 (Current allocation): CICRA proposes to allocate a minimum amount of spectrum (40MHz of 3.4-3.8GHz spectrum per operator) to multiple operators in Jersey and in Guernsey without suitable spectrum, subject to a set of minimum requirements in terms of roll out of 5G services. Applicants will be able to apply for additional spectrum (in the 3.4-3.8GHz and 700MHz bands) if they are prepared to make commitments that exceed the minimum requirements. While the amount of spectrum to be issued will vary depending

[1] CICRA 5G Spectrum: Draft Statement of Intent: https://www.jcra.je/media/598032/5g-spectrum-statement-of-intent-consultation.pdf
[2] JT's Response to CICRA's Consultation: https://www.jcra.je/media/598143/5g-spectrum-statement-of-intent-jt-response.pdf
[3] Sure Response to CICRA Document 19/21: https://www.jcra.je/media/598140/5g-spectrum-statement-of-intent-sure-response.pdf
[4] CICRA 5G Spectrum: Statement of Intent 19/21: https://www.jcra.je/media/598136/5g-spectrum-statement-of-intent.pdf

on the degree to which operators are willing to exceed the minimum requirements, some 5G spectrum (at least 100MHz of 3.4- 3.8GHz) will be held back.

Stage 2 (Future allocations): Further allocations of 700MHz and 3.4-3.8 GHz 5G spectrum will be made when 5G technology matures and when there is more clarity over demand for 5G spectrum from new use cases and applications (e.g. from verticals)."

CICRA was dissolved in April 2020, at the request of the Jersey Government, and responsibility for spectrum licensing reverted to each Island's respective regulator, the GCRA and JCRA.

APPENDIX 6: 5G LICENSING PROCESS IN JERSEY

CICRA was dissolved in April 2020, at the request of the Jersey Government, and responsibility for licensing reverted to the JCRA and GCRA.

In May 2020, the JCRA put a hold on the process for licensing 5G spectrum in Jersey. This was because of uncertainty over the COVID-19 pandemic and concerns expressed by the Government of Jersey regarding the security of 5G infrastructure.

Two of Jersey's policy principles are:

1 Policy principle 1 – Promote the path to next generation connectivity building on the current advanced digital infrastructure already in place, including by: i) Being a fast adopter of next generation technologies that have been tested. ii) Incentivising mobile network sharing and rollout of mobile next generation technologies such as 5G.
2 Policy principle 2 – Promote retail competition (not network competition) as the most effective way of delivering the benefits of next generation connectivity to consumers and businesses, including by: i) Ensuring fair and reasonable, non-discriminatory access to the gigabit fibre network for mobile backhaul.

The JCRA restarted the 5G award process by undertaking a reassessment of interest and demand[1] in March and April 2022, and issuing the outcome[2] and statement of intent[3] in June 2022.

The outcome of the consultation including the licence application process was issued in September 2022[4]. In this ITT, the JCRA invited applications for the following 5G spectrum packages:

> "Up to three x Full-Service spectrum packages, intended for Island-wide networks providing publicly available services for the maximum number of users, with each package having:
>
> a) Up-to-100 MHz contiguous spectrum in the 3.4-3.8 GHz band; and
> b) 20 MHz (2 x 10 MHz paired) spectrum in the 700 MHz band.
>
> Each package will have an initial allocation of 40 MHz contiguous spectrum in the 3.4-3.8 GHz band, increasing incrementally and equally for all package holders to 100 MHz subject to:
>
> a) Effective defragmentation of spectrum in the 3.4-3.8 GHz band to create the required contiguous spectrum;
> b) 5G service launch within a defined period of Ofcom awarding a

[1] 5g-spectrum-award-consultation-to-reassess-interest-and-demand.pdf (jcra.je)
[2] 5g-spectrum-award-consultation-on-draft-invitation-to-tender.pdf (jcra.je)
[3] 5g-spectrum-award-updated-statement-of-intent.pdf (jcra.je)
[4] 5g-spectrum-award-response-to-draft-itt-consultation.pdf (jcra.je)

spectrum licence and roll out of a minimum stated number of 5G equipped base stations; and

c) Demonstrable evidence presented that spectrum already awarded is being efficiently used."

Licensing requirements, terms and conditions and the tender process can be found on page 14-27 of the document.

In January 2023, the JCRA announced the acceptance of applications for spectrum from JT (Jersey) Ltd and Sure (Jersey) Limited and intends inviting applications for the third 'Full Service' 5G spectrum package during 2023[5]. Having completed the local regulatory processes, the JCRA wrote to Ofcom recommending it awards 5G spectrum licences to JT (Jersey) Ltd and Sure (Jersey) Limited.

The 5G spectrum award ITT process required applicants to agree to certain terms and conditions designed to ensure the efficient use of allocated spectrum and that Islanders could begin accessing 5G services within a reasonable period of time. These terms and conditions are included within the letters of recommendation sent to Ofcom and published on the Authority's website. JT letter[6]. Sure letter[7].

In June 2023, JT announced a £80m investment to bring 5G to Jersey, by signing a deal with Swedish tech giant Ericsson to upgrade the island's mobile network from 4G to 5G.

On 1st November 2023, the JCRA announced that it had decided to delay the ITT for the third 'Full Service' 5G package until after it concludes the case considering Sure (Guernsey) Limited's proposal to acquire Jersey Airtel Limited. This decision was made to help avoid the risk of potentially inefficient spectrum allocation.

[5] 5g-spectrum-award-itt-outcome-press-release.pdf
[6] Board Authority Paper (jcra.je)
[7] Board Authority Paper (jcra.je)

18 November 2024

To: Deputy Neil Inder
President, Committee for Economic Development
States of Guernsey
St Peter Port
GY1 3GX

By email only.

Dear Deputy Inder

Re: Spectrum Licensing Framework to Deploy 5G and Successive Technologies Policy Letter

Thank you for the opportunity to respond to the proposed policy on spectrum licensing for 5G deployment in Guernsey.

The GCRA acknowledges the importance of a robust digital infrastructure for the Bailiwick's economic growth and strongly supports the Committee's approach to spectrum licensing as outlined in the draft Policy Letter.

I want to record the positive and collaborative approach your team has taken in developing this policy which has been appreciated. The GCRA will of course continue to offer its assistance to support these policy ambitions.

1. **Do you agree with the policy principles and objectives outlined in Section 11 of the policy letter?**

   The GCRA supports the policy principles and objectives set forth in Section 11 of the policy letter, including the commitment to a technology-neutral approach for spectrum allocation. This approach aligns with the GCRA's legal role given to it by the States in supporting telecommunications innovation and ensuring efficient use of the Bailiwick's spectrum resources, enabling operators to deploy a range of technologies based on market demand and future needs.

   It is worth underlining that market conditions play a decisive role in achieving desired policy outcomes. In highly concentrated markets, the usual market pressures are significantly

diminished, and in that context there is a particular risk of misalignment between policy and commercial priorities. While the legal and regulatory framework can mitigate certain risks arising from market concentration and can facilitate certain outcomes, it does not ultimately deliver them.

The legal and regulatory framework should also be fit for purpose and future-proof. The GCRA will therefore shortly commence a review with a view to ensuring the framework best supports the policy ambitions. This may require legislative change and the Committee will be approached at the appropriate time to that end.

Do you endorse the States directions in the policy letter and are these achievable from a GCRA perspective?

We endorse the States directions as presented in the policy letter and believe they are achievable. However, see response above. Certainly, a technology-neutral policy provides flexibility, encouraging operators to adopt the most suitable and advanced technologies, thus fostering a competitive and progressive market environment. The GCRA is prepared to work closely with all stakeholders to implement these directions in a timely and effective manner.

2. **Are there any sections of the policy letter that raise concerns with you?**

   We will continue to assess any operational implications of the policy framework as part of our implementation planning.

   We had one particular observation in relation to Appendix 1 which refers to "*Encouraging adoption of a single network – retail competition not network competition*." While current understanding of network costs and technologies in a small scale economy may support such a view at present, future technologies and the economics of network build may change and present opportunities for the jurisdiction the States may not wish to appear to rule out. We therefore suggest this position is tempered to allow for the possibility of some forms of network competition as technologies and economics of network build develop in future.

3. **If the States endorses the directions in January 2025, when would the GCRA be able to start assigning spectrum for 5G use cases?**

   The GCRA anticipates that the proposed timelines will allow the necessary procedural and operational steps to be taken, to ensure an efficient rollout of this policy in early 2025.

4. **Do you have any other general comments on the policy letter?**

   The GCRA is aligned with the vision of creating a world-class digital infrastructure in Guernsey. We commend the Committee's forward-thinking approach and look forward to supporting the digital transformation of the Bailiwick through our regulatory oversight and commitment to market fairness and innovation.

Thank you once again for this collaborative engagement.

Yours sincerely,

Chief Executive Officer
Guernsey Competition and Regulatory Authority

Committee *for*
Economic Development

THE STATES OF DELIBERATION
of the
ISLAND OF GUERNSEY

COMMITTEE *for* ECONOMIC DEVELOPMENT

SPECTRUM LICENSING FRAMEWORK TO DEPLOY 5G AND SUCCESSIVE TECHNOLOGIES

The President
Policy & Resources Committee
Sir Charles Frossard House
La Charroterie
St Peter Port

19th December 2024

Dear Sir,

Preferred date for consideration by the States of Deliberation

In accordance with Rule 4(3) of the Rules of Procedure of the States of Deliberation and their Committees, the Committee *for* Economic Development requests that the Spectrum Licensing Framework to Deploy 5G and Successive Technologies Policy Letter be considered at the States' meeting to be held on 5th February 2025.

Yours faithfully,

N R Inder
President

S J Falla
Vice-President

N G Moakes
A Kazantseva-Miller
S P J Vermeulen

A Mancini
A Niles
Non-States Members