Preparing for 5G in New Zealand

Opinion Submission by Enable Networks Limited

Enable Networks Limited (**Enable**) is pleased to have the opportunity to respond to the Radio Spectrum Management Policy and Planning group and the Ministry of Business, Innovation and Employment in relation to Preparing for Fifth Generation Cellular Implementation (**5G**) in New Zealand.

About Enable

Enable is a Local Fibre Company (**LFC**) supplying open access fibre infrastructure supporting Ultra-Fast Broadband services to schools, businesses and homes across Christchurch and the largest towns of the Waimakariri and Selwyn districts of the South Island.

Executive Summary

Enable is highly supportive of 5G which is being heralded as a technology which is likely to be crucial in driving a fourth industrial revolution and will become another key national telecommunication infrastructure alongside fibre for New Zealand.

The application of 5G infrastructure to enhanced mobile broadband, ultra-reliable and low-level communication and massive machine type communication (in a mobile context) will be intrinsic to the way we will all conduct our lives. We are also of the view however that many of early commercial non-mobility use cases (particularly those requiring 26GHz densification) touted to be made possible by 5G have existing and parallel solutions which are arguably better or at the least as capable when considered in a New Zealand context. We believe it important that a market driven 5G deployment race does not dive the assignment of long term rights without first concluding consideration of likely required access of new vertical industries directly or indirectly to the spectrum. Such considerations are essential in shaping the diversity of retail telecommunications for the next 20 years.

More specifically we are of the view that 5G will bring enormous value in supporting new use cases requiring the combination of mobility with low latency and throughput, e.g. ultra-high definition mobile entertainment, mobile augmented reality diagnostics, drone and autonomous vehicle control, logistic tracking, video surveillance, etc. Consideration must be afforded however, to the fact that many of these innovation areas may develop as separate vertical markets and not necessarily from a retail portfolio product of existing cellular operators. Equally many of the "non-mobility" use cases such as wireless to the home, smart city, internet of things (**IoT**), home and industrial automation, remote surgery, in premise augmented and virtual reality and gaming all have very capable existing solutions available and 5G will simply allow the opportunity for these to be supplied by a different competitive access technology.

Technology neutrality is recognised as a fundamental principle of general telecommunications regulation. With fixed and wireless infrastructure applications becoming increasingly overlapped and integrated in providing end user services, we view it as essential that the Government approach the structure of 5G deployment following the principles of Technology Neutrality. If this is not the case, then the commercial activities of one group of suppliers (based on the technology they use) will be limited while other competitors (who use other technologies) will be unconstrained and indirectly supported. This would lead to stifled innovation, reduced investment, and ultimately reduced consumer choice.

The allocation of spectrum for 5G must, therefore, in Enable's opinion, take into consideration that the spectrum rights made available for purchase will support far more than simply the enhancement

of existing mobile communications to 5G. Rather the ultimate owner of spectrum rights will be purchasing rights to compete in existing markets against other established solutions and if the allocations take a traditional form, will gain significant degrees of exclusivity in being able to do so. Due to the aforementioned breadth of future services which will be underpinned by 5G, we refer in the remainder of this submission to 5G more broadly as Next Generation Wireless Services (**NGWS**) as 5G incorrectly sets a scene that this is simply a cellular (mobile) upgrade which it is not.

Enable has provided detailed responses to the questions below, however, we draw attention to the following overarching matters.

a) NGWS is likely to introduce a revolutionary rather than evolutionary change to breadth of application of wireless communications across New Zealand. Aside from capacity growth, mobile telephony, messaging and relatively high-speed data services are already well catered for over existing 4 and 4.5G mobile infrastructure and associated spectrum ranges. However, the opening of cellular networks to supplying what was traditionally fixed endpoint services (without the regulatory constraints of the fixed industry) is noted to currently be reducing the capacity of the available spectrum. New mobility services will require increased spectrum, but it must also be recognised that although consumption of data wirelessly is projected to significantly increase, with a corresponding reduction in wire connected devices, the main locations from which mass consumption of data will continue to remain the inside of buildings and from fixed sites for CCTV. In this respect New Zealanders are in an enviable position globally as we already having high speed fibre deployed into many homes which, when coupled with the correct WiFi solution, can already provide gigabit services to localised devices.

b) With conventional wireless telecommunications already catered to in existing spectrum ranges with 4.5/4.9G, Enable is of the view that 5G (or at least 5G mm wave densification) is to 4/4.5G as fibre was to copper. We see little difference in respect to the importance which needs to be placed on structuring the allocation and supply of 5G spectrum for support of an open and competitive market (affordable and agile availability of spectrum or open infrastructure access) to that which was devoted to fibre. Without such consideration local and national private vertical innovation is likely to be constrained to simply offerings which lie within the vision or economic desire of but a few cellular retail providers. This would be detrimental to the growth of adjacent markets or, as a minimum, the market development of adjacent markets by smaller innovator companies will be very difficult.

c) In the telecommunications landscape of the next decade the boundaries of fixed and mobile use cases will significantly overlap and Enable submits that equivalent considerations need to be ensured for access seekers to communication infrastructure, irrespective of the technicalities of transmission medium (light, radio waves). Enable believes that a fundamental guiding factor must be that retailers of NGWS should be able to openly access and sell high speed and reliable connectivity inside of buildings (through fibre and high speed WiFi), coupled with seamless handover outside of buildings for mobility (5G) without consideration of the underlying technology. Fibre and 5G will be of equal critical national importance in respect of ensuring retail competition. Competition between fibre and NGWS will increase which will be to the benefit of consumers, however the Government must remain technology neutral and not impose restrictions on one mechanism of supplying services that is not

mirrored to others. Equally, if open access has been of such material importance to ensure an open market for fibre it is unconceivable, that equivalent thinking would not apply to NGWS or the underlying spectrum.

d) Enable is of the view that NGWS must not be considered as a traditional cellular operator upgrade or spectrum allocation matter. This assertion is not underpinned by technical matters but rather the fact that 5G (a part of NGWS) is becoming increasingly stated as a likely driver of the fourth industrial revolution. This revolution relates to the connectivity of everything to everything else, where the connectivity of people, devices and machines will be the foundation transformational driver of the way we conduct our lives and business of the future. The allocation methodology for spectrum will thus have a profound effect on the flexibility for future market innovation and in shaping of the retail market not only for the services which we can relate to today but also for many new and potentially private, localised or national vertical solutions, which are yet to be established and will evolve over the next 20 years. The methodology for the allocation of spectrum cannot sit distinct from a methodology of access seekers to gain access to spectrum whether this be by a mechanism supporting agile access by innovators to spectrum itself or through a mechanism to access at an infrastructure level native connectivity on am equivalence basis.

Enable observes that a 5G race is rapidly developing which could end in critically stifling national innovation if the industry context is not first appropriately considered. While the certainty of rushing to into a technology deployment may achieve kudos, it is likely to come with price of missing the establishment of effective foundations required to best leverage the technology for our economy. We are of the view that the potential innovation and national economic damage likely to result from the imposition of a rushed deployment on the New Zealand community and on commercial entities is a price too great to pay for simply a speedy implementation of a defective deployment. We note that parallel to this submission a study is to be commenced by the Commerce Commission into the future operating model of the mobile telecommunications market in New Zealand. We are strongly of the view that that review must be completed prior to any decisions being made on the establishment of methodologies for long term 5G spectrum allocation as such a methodology must, in Enable's opinion, be informed by the outcomes of that study. We reflect on the degree of foresight MBIE placed in establishing open access to fibre to the premises infrastructure and how this has resulted in New Zealand already being ranked by FTTH Europe within the top 15 nations globally in respect to direct access to fibre to homes and progressively rising further in its ranking as connections are taken up. Enable encourages MBIE to consider with a similar degree of holistic thinking the positioning and structured considerations required to integrate 5G into the New Zealand telecommunication ecosystem.

Disclosure of Interest

Enable is a significant investor in long term open access communications infrastructure for New Zealand. We facilitate the establishment of a diverse and innovative retail market embodying extensive consumer choice and competitive retail offerings. Enable is keen to investigate and participate in industry partnerships (where it is commercial viable) to support 5G to the upmost and particularly in respect of densification and, in the opinion of Enable, requires open access consideration in order to establish an effective and diverse retail market and truly support innovation and inclusion.

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Overarching Theme

Enable is highly supportive of advancing the deployment of 5G for New Zealand. 5G infrastructure, together with fibre infrastructure, represents parallel communication infrastructure deployments. Fibre is and 5G will become of collective foundational national importance for connected society innovation and digital inclusion. With the right application and oversight these two infrastructures can provide a whole greater than the sum of the parts and which act cooperatively with transparent handover of content from inside to outside premises. However, to obtain this equilibrium Enable is of the view that the rules underpinning NGWS infrastructure must be similarly construed to fixed communication infrastructure and to do otherwise discriminate based on technology.

Enable is of the view that the spectrum allocation methodology must not, by design, preclude localised NGWS vertical solutions being established by innovators seeking to make an entry in to the market. Given the scale of change that is envisioned with the advent of NGWS the allocation of rights in spectrum must be of a form which ensures support for a significant evolving market change in both the number of service suppliers and their scope of service offerings. We note on the global stage examples of private LTE (and evolving MulteFire), and Private IoT implementations are already making grounds in large integrated operations like dockyards, airports, mining areas etc as a private localised service separate from national telecommunications. Private NGWS IoT in time and with availability of private spectrum may become an investment which rural communities may also consider themselves etc and for which the use of general access spectrum is not viewed sufficiently robust. Whether such a rich ecosystem of 5G retail services develops over time, only time can tell but we are strongly of the view that the methodologies that are brought into place now must not precluded such a dynamic market becoming established through early constraints imposed by the methodology of spectrum rights licensing or related open access to infrastructure on which vertical services can be established.

Q1: What are the likely uses for 5G in New Zealand initially and in the longer term?

Enable's view of the likely application of 5G is included below, however, we note that 5G is a part of the foundational NWGS infrastructure touted in the industry to represent the foundations of the fourth Industrial Revolution for which applications are in their infancy and many will only eventuate (particularly in non-traditional cellular areas) with its availability to innovators.

The most important matter of consideration is ensuring that spectrum allocation, and any related regulation, support an agile and innovative retail environment with open availability to access seekers to spectrum resources for wireless infrastructure levels on an equivalence basis. This is analogous to the steps made by government to ensure assess to optical resource.

Vertical and local innovator solutions need to be supported and we would argue incentivised through the mechanisms of either spectrum allocation itself or indirect allocation to spectrum at an infrastructure access level.

Enable is of the view that 5G uses will fall broadly into eight categories these being its application to:

'internet mobility' embodying activities familiar to us today however, with enhanced speed and reliability thus improving considerably our **'mobile' (whether on foot or in a vehicle)** experience, enjoyment and safety and diversity of where we can consume those services.

Streaming of video to devices while out and about (mobile) is commonplace however 5G (Enhanced Mobile Broadband) with its greater bandwidth will support a significantly richer multi-media experience opening the door to enjoyment of such services as full HD streamed entertainment in vehicles with individual viewing per seat and likewise to new generation handsets and the potential ability to seamlessly continue watching media from inside a building to out of building networks.

'wireless to the home' otherwise referred to as fixed wireless/portable wireless/media-to-the-display/fibre substitution, all in essence commercially seeking to transfer end users from fixed services in their home to a NGWS supplied service.

Enable's response in this area may appear introspective however we find it hard to see that fixed wireless will add any incremental value to New Zealand consumers. Many parts of the world are not as fortunate as New Zealand and do not have the luxury of high bandwidth internet to the home due to the high cost to deploy fibre infrastructure. In these localities NGWS is being seen (and rightly so) as a great way of finally bringing high speed to those users. In New Zealand however, we draw attention to the fact through significant Government investment New Zealand sits within the top 10 countries of the world in respect of the percentage of homes consuming a fibre service (excluding FTTB). New Zealand's ranking continues to grow significantly year on year as UFB deployment continues and by its completion in 2022, 87% of premises will have access to fibre for carrying communication into the premises. From a fibre building service gigabit Wi-Fi can supply the needs to wireless connect of all portable devices inside buildings much more capably than 5G. The global attention to the capabilities of 5G (fibre substitution) from an inbuilding perspective are therefore in Enable's view not relevant to New Zealand where we already lead the world as opposed to being forced into seeking lower capability but sufficient solutions due to prohibitive fibre deployment costs.

It is of note that this use case is however one of the primary ones requiring 26Ghz small cell densification to seek to supply gigabit wireless connectivity from the street into homes and therefore it brings into question whether such densification is well placed in New Zealand or whether it represents simply the commercial investment by some companies seeking to establish exclusive non-open infrastructure to seize greater market control of the home broadband market.

'enhanced immersive experiences' through cloud virtual reality and gaming (extending from visual to hepatic feedback) and including superimposed augmented reality facilitation.

Enhanced immersive experience will be leveraged through NGWS and offer greater freedom of immersive mobility. Enable notes that despite marketing 5G is not the enabler of Immersive Virtual Reality (VR) or Augmented Reality (AR). Both are available today and improving rapidly with devices connected over high speed WiFi, for example Wave2 from Microsoft HoloLens being the most recognised but many other devices are becoming available some by notable companies including Carl Zeiss. Remote surgery is also tagged as enabled by 5G however remote surgery has been possible over fibre for a number of years and Enable would view it as unlikely that reliability over a wireless connection would be at a level of medical dependency compared to the choice of fibre. Remote (Mobile) AR guided diagnosis and instruction is however a likely area where NGWS will open new possibilities as will the delivery of interactive VR to large concentrations of wireless visualisation devices in a common location (such as at events) which is simply not possible over todays wireless solutions.

'sensor/decision control environments' Low Power Wide Area Networking is already growing strongly in both (general) unlicensed and licenced spectrum with LoRaWan, SigFox, Weightless, LTE-Cat M1

and an array of other specific to industrial, civic, agricultural application domains. IoT and 5G will add a further technology options into the mix for provision by cellular operators but 5G is not the single enabler of such an ecosystem rather a new entrant competitor.

Of note here is that 5G is not the enabler of IoT; there are many industrial, civic and home solutions already being successfully deployed using other telecommunication spectrum ranges and protocols.

5G will bring new offerings to IoT connectivity, particularly for the use of 'critical' devices requiring very high reliability, for logistics tracking and obtaining data for moving sensors, and for sensors requiring high bandwidths or long duty cycles (noting these are a minority).

Although 5G may be applied into local area IoT situations like home automation, Enable anticipates that its application is more likely to be valuable to sensing and control of mobile endpoints or endpoints for which larger data payloads or duty cycles are required than typical sensor applications.

Agriculture and Smart City's

5G NB-IoT is touted to revolutionise agriculture, and live-stock farming and smart cities but this does not recognise the already significant solutions already possible using LoRaWan, CAT-M1, SigFox amongst others in this space which have already established solutions with strong portfolios of cheap and long life long range sensors.

Home Automation

Home (Local area) IoT continues to see a strong and growing application of ZigBee and Z-Wave based short range hub enabled interfaces with strong presence of large corporations, such as Philips, Samsung, Google, Apple, Amazon and others all communicating ultimately over a fixed service to the internet through a router connected hub. 5G may well have a part to play here but again there is certainly a very capable existing ecosystem forming in this space other than a requirement for NGWS and again a very significant array of very low cost long life sensors. The challenge in this space remains more the integration between the vertical ecosystems despite the infrastructure operating on common communication standards although a number of cloud based cross ecosystem solutions are evolving which starts to bridge this gap.

Industrial Automation and Logistics

Industrial automation is likely to be an area of application of 5G however of note is that this is also an area where large private companies may wish to invest in local private 5G invocation deployments specifically tuned to their requirements rather than seeking to contract a retail service. Cases are being noted globally where large industrial organisations are already implementing localised control and site-based communication solutions. Again, however once Mobility requirements come in to the frame such as logistics tracking significant value in 5G can be foreseen.

'ubiquitous cloud video surveillance and related applications' embodying Artificial Intelligence (AI) image recognition and behavioural prediction.

The ability to install and connect ubiquitous high definition video cameras with supporting AI analysis of sound and visual information for behavioural patterns would be expected by Enable to be significant application area for 5G.

'remote drone vehicle control' including aerial drone reconnaissance, drone remote control mining vehicles , and cooperative drone group coordination.

Enable again views this as an ideal application of 5G where the low latency and reliability will support precision control and the potential to return feedback such as hepatic feedback to a remote operators of drone vehicles. Many types of remotely operated vehicles are likely to be developed not solely for

aerial recognisance (the typical use of the word drone) but also for mining, drilling and all situations where remote operation of equipment provides a substantial safety benefit. This is likely to extend to hybrid-controlled robotics. With local as well as remote high-speed intercommunication self-coordinating adaptive drone's groups are likely to eventuate. For many applications such as mining remote 5G (or even private 5G) installations would be likely to be required.

'automobile connectivity' including in the first instance intelligent impact avoidance and extending to autonomous environmentally aware control. This use case is one which gains significant attention given its forward looking glamour. Enable believes this will gain initial market in assisted impact avoidance and for autonomous control in closed environments such as airport terminal transportation etc where the risks of unpredictable movements (e.g. pedestrian movements) can be better managed than shared carriageway/pedestrian traffic areas of cities. Deployment of such technology in public thoroughfare is less a matter of technology as the greater holistic consideration that would need to be applied to matters such as our legal frameworks and clarity of liability in the case of accidents or deaths resulting from such technology.

Summary

It would be short-sighted and presumptuous for Enable to seek to preordain what will be enabled by NGWS. Similar to fibre, it is an enabling infrastructure platform from which solutions requiring reliable and bandwidth intensive communications can rely upon as a foundation. There is opportunity with 5G to build into the process of spectrum allocation or infrastructure access which supports diversity and innovation for diverse solutions as opposed to limiting the resources to be provided to innovators in a closed and controlled form a few organisations perceived today as the only suppliers of such services.

Q2 Do you consider competition should be encouraged at the infrastructure level or purely at the retail level for 5G? Why?

Enable believes that the matter is not one of whether competition should be encouraged but rather whether telecommunications competition should be treated by MBIE as technology neutral or technology specific. MBIE has, to date, sought to ensure that supply of telecommunications over fixed infrastructure is open and prevents infrastructure providers from providing retail services. The question given the likely innovative platform which NGWS will be provide is should the same considerations apply or rather should NGWS be supported as a closed environment with rights and freedoms which support the long-term exclusivity of today's existing limited number of retailers.

Enable is of the view that an open access approach to 5G infrastructure (and the spectrum which underpins its use) by all access seekers would (a) enhance competition in the NGWS retail market which is currently highly constrained when viewed from a subscriber percentage basis per operator (b) support new innovative and niche innovative entrants with large national or small local solutions (c) encourage single deployment/multiple use philosophy thus reducing unnecessary environmental pollution (visual and non-ionising radiation levels) through duplicate/triplicate infrastructure densification deployments.

It is possible, for example, that Neutral Hosts (separate from retail providers) may be able to play a part in establishing and operating parts of the 5G infrastructure platform. Fundamental to spectrum assignment should be a model which facilitates open access neutral hosting (a neutral

party operating densified cells and coordinating the use of spectrum amongst its users) and clarifying whether such Neutral Hosts would need (a) to acquire their own spectrum or (b) for them to broker use of spectrum through prior spectrum agreements by their respective retailers and a pool allocation to smaller player.

We are of the view that:

1. Government expectations and regulation should be technology neutral;
2. Open access should be the resulting outcome; and
3. 5G infrastructure owners should be bound by non-discrimination and equivalence obligations and potentially subject retail prohibition if they exercise a substantial degree of market power.

As matters stand today the primary retailers of mobile services are also the same companies which collectively hold 80% market dominance in the fixed residential broadband market. They also hold exclusive rights over the majority of private spectrum, own and operate their own exclusive cellular infrastructure and have unrestricted ability to establish, acquire and operate fixed networks. This is completely at odds with the way the mode of operation of the fixed industry and the constraints placed upon it by Government.

Enable can see no reason why MBIE would seek to provide exclusive and long-term rights (spectrum) without a requirement of open access or neutrality of hosting to the same "retailers" and without significant prior consideration of the evolving market and the place that the government should play. Post deployment of 5G there would clearly be benefit to the owners of 5G densified solutions reducing input costs through seeking to move a greater share of residential users to its own fixed wireless investments. Greater competition in the benefit of the consumer is welcomed but it must be on an even playing field for both Fixed and Wireless infrastructure operators and open to all retailers.

Q3. What regulatory issues need to be considered from a 5G perspective in New Zealand?

(a) Regulatory best practice suggests that regulation should be imposed if a person (or persons) is able to exercise a substantial degree of market power. If only a couple or a few of retail providers are able to deploy the requisite 5G infrastructure, then these retail providers will more than likely be able to exercise a substantial degree of market power in the 5G space and this issue needs significant consideration by MBIE.

(b) The access to 5G at an infrastructure level to retail innovators to establish and serve vertical markets on both a local geographic and national basis.

(c) The sustainable integration and handovers between 5G and fixed broadband.

(d) The sustainable deployment of street furniture including small cell densification (rights of placement) but consideration for a requirement of shared densified infrastructure to prevent unnecessary visual and elevated non-ionising radiation levels.

(e) Powers to prevent stockpiling of spectrum bases on requirement of actual usage reports.

(f) Consideration to dynamic spectrum allocation assessed annually, committed use blocks having a different allocation regime to burst or reserve blocks.

(g) The assessment of the adequacy of current protections relating to personal data as 5G will in some applications result in amassing Big Data which may include personal identifiable information, and therefore it is critical that handling of Big Data be fully assessed.

Q4. What aspects of these regulatory issues are most significant for 5G?

5G Open Access

One could argue that competition has been considered generally in the Telecommunications industry through the Telecommunications (New Regulatory Framework) Amendment Bill however, this was conceived at a time prior to full considerations of NGWS and their overlap with fixed services. A backdrop to legislative thinking during its conception was the prevention of monopolistic behaviour of fixed service asset owners (this being a context easily identifiable with from the years of Telecom). The principles of technology neutrality and open access need equivalent consideration for 5G.

With long term spectrum rights provided to a select number of retail companies without any requirement to provide open access 5G products a retail market it is likely to eventuate with two of the retailers holding (i) a significant large share of 5G spectrum rights, (ii) the majority of supporting cellular infrastructure, (iii) their own fibre and hybrid fibre-coaxial networks, (iv) 71% of the fixed market retail share and nothing to prevent them deploying or acquiring further network infrastructure for their sole retail purposes. This is obviously not in the best interests of consumers and paves the way to the potential re-establishment of a Telecom of new.

It could be argued that from this could be addressed through MVNO arrangements however such arrangements in New Zealand have been historically been few and far between and it is unclear how such large-scale resale branding models would in any case foster niche small scale innovators in the 5G retail space being able to develop and market into new vertical segments of the market.

Historically fixed and wireless infrastructure had specific use cases with little overlap to cellular and they were discrete and complimentary. Further, fixed infrastructure was an essential asset that required special protections by the Government to ensure access to innovators. Strangely, spectrum (perhaps because it cannot so readily be seen, touched etc) has been free of any such constraint and is sold to retailers as a direct asset with no requirement of open access.

With the advent of 5G there is no question that vertically integrated retailers with unregulated infrastructure and ownership of spectrum will seek to regain revenue to compensate for capital investment in the 5G deployment. Any manipulation of the market in this respect need to ensure protections are in place and considered.

Visual Pollution and Non-Ionising Radiation Pollution

Enable notes that investigation is underway to assess if the current environmental standards governing the location of cellular transceiver antennas would be sufficient to cover 5G antenna deployment. Enable would be both highly surprised and disillusioned if this were to be the case. It is

important that considered changes to the National Environmental Standards (**NES**) start from a context of what is likely to change with the deployment of 5G rather than what is similar and for those aspects which are significantly different like 26/28mm densification (potentially with overbuilds by all operators) to be assessed formally to ensure that matters of visual and RF pollution are minimised and not simply matters of commercial decision making by operators.

Initial deployment of 3.4GHz 5G is not expected to require significant densification of antennas however as 5G deployment gains pace and higher throughputs are targeted 26GHz is anticipated to be deployed with propagation characteristics which will require a substantial infill of small cell antennas. Although evidence from trials in the USA indicate that the application of technologies such as Massive MIMO will result in greater range than expected from such antennas (including a degree of non-line of sight coverage) there is still little question that a significantly densified antenna programme will need to be undertaken to achieve the very high data rates being promoted in current marketing. It is essential that the initial low densification requirement does not misinform NES critical for 26GHz densification the density of which will be unprecedented.

Enable submits therefore that the NES must seek to limit unnecessary proliferation of small cell antennas in overbuild deployments by multiple operators which would solely be self-serving and originate from past practice and the lack of open access requirements of such infrastructure on an equivalence basis to other operators.

Enable has followed the developments of 5G globally for several years and we have observed for some time the risk seen by the incumbent cellular industry globally to how small cell densification will be approached at national and local planning levels and the lobbying underway in other regions. To some degree visual impairment may be able to be lessened through camouflage solutions which are in development (noting however this is more expensive to deploy and seems to be deployed only where environment standards require indicating the importance of updating the standards). However even with extensive use of camouflage given the current non-conclusive nature of the long-term effects on human philology from radio frequency exposure to millimeter wave radio waves Enable submits that there must be a fundamental intent (backed by required environmental standards) to ensure the minimum necessary aggregate exposure to radio frequency emissions.

Specific upfront attention is required from both national and local planning perspectives to ensure that resource management planning considers ahead of densified antenna deployment matters including the maximum density of antennas per area (irrespective of operators) and the level of camouflaging and placement that should be required. In addition, there should be consideration as to whether there should be mandated sharing of densified antenna deployments based on (a) ensuring sustainability and reduce wastage (b) reduce visual position (c) reduce antenna overbuilds by each retail supplier which unjustifiably increases the density of non-ionising radio frequency radiation in residential areas.

Enable notes that the subject of health considerations has been incorporated into this question:

Enable is not qualified to make comment on the specific health matters and would rely on those in the medical and medical research field to provide in this regard. fibre by its nature communicates using photons of light and produces no non-ionising radiation. We note however the following:

(i) The subject of health effects of non-ionising radio sources is a long standing one and is disturbing to many people in their environment regardless of the lack of conclusive

evidence to it being a health concern. We note in this regard however the International Agency for Research on Cancer (IARC) under the World Health Organisation continues to classify radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), a category used when a causal association is considered credible, but when chance, bias or confounding cannot be ruled out with reasonable confidence. This matter is under continuous monitoring and accordingly, it would seem prudent that prior to high densification the Government should again satisfy itself that the specific combination of frequencies (rather than RF generally) and densities being intended to deploy have to its satisfaction have no undue effect on health.

The preamble to this question indicates that to date decisions have been made not to enforce New-Zealand's non-ionising health standards on handsets. It is unclear to Enable why this approach would naturally simply continue to new 5G devices where these operate with differing frequency ranges (particularly 26Ghz) in very close proximity to persons. It would seem that either the standards for exposure of devices in general are set too low and should be changed or if this is not the case that mobile handsets should either (i) conform to be permissible for sale in New Zealand or (ii) an obligation should exist to clearly mark such equipment in a manner to make clear to the purchaser that it does not meet New-Zealand emission health standards.

It would again seem prudent that the Government would wish to confirm to itself that the prior logic of not enforcing emission standards on handsets remain advisable with the new proposed frequencies and particularly 26GHz. If the standards are set at appropriate levels, there would seem to be no clear justification which does not impose a risk on individuals for exceptions.

(ii) A recent submission to the Select Committee in relation to the Telecommunications (New Regulatory Framework) Amendment Bill was noted by a number of individuals and in particular a joint submission containing the view of 100 international medical professionals expressing concern that insufficient study had been conducted in new proposed widespread use of the 5G spectrum. It again would seem prudent that MBIE ensure itself that no undue health outcomes eventuate from the specific frequencies that may include the requirement for revised product markings, assessing maximum transmission power etc.

(iii) We note the question considers handsets and cell towers but is absent from considering any health matters which may relate to the likely proliferation of internal fixed 5G modems into people's homes and the location of these thereof that will eventuate with fixed wireless broadband offerings.

Q5. Do you agree that the 3.5 GHz band is the top priority for allocation for 5G?

Yes: Opening access to the 3.5 GHz band (3.4-3.7 GHz) as a top priority is prudent.

(a) International Harmonisation is now significantly progressed. This being important to support seamless roaming and the economies of scale necessary to drive down the cost of equipment:
    i. Aligning with WRC-15 with a harmonised International Mobile Telecommunication (IMT) identification for 3.4-3.6GHz throughout Regions 1 and 2 and in many countries in Region 3.
    ii. ECC recent approvals of recommendations to harmonise 3.4-3.8GHz
(b) The band supports introduction of 5G with significantly less requirement for densification than 26Ghz offering a sweet spot for early deployment between range and available post reallocations of significant contiguous spectrum.
(c) The band has been an early focus of 5G development by equipment manufacturers and some of the initial deployments of 5G in many countries are expected to use it.

Q6. Do you have any comments on reallocating 3587 to 3690 MHz for 5G?

No

Q7. Do you agree that the 26GHz band is a high priority for allocation to 5G in New Zealand?

Yes.

We note significant harmonisation occurring in this band in Canada, Europe Middle East and Africa. There are significant opportunities within this spectrum band to harness large contiguous bandwidths to provide very high-speed wireless data services. Where massive increases in Gbps connectivity spectrum allocations are required this range is expected to be crucial. However due to propagation characteristics deployments in this frequency band will require a significantly greater degree of densification than in the C band and therefore significant study is required into ensuring the environmental and physiological factors is required including any requirement to minimise massive multiple company deployments of close proximity antennas required. In this regard the matter of consideration is the relative economics as densification at 26Ghz will bear a high capital investment.

Enable notes two current 3GPP Proposals in this area of spectrum:

26GHz band: 24.25-27.5GHz
28GHz band: 26.5-29.5GHz

and the general absence of consideration of the 28Ghz band (presumably due to current allocations) although mentioned in Q11.

Q8. Would this band be of interest to your organization for trials for 5G services in New Zealand?

Yes. Enable believes that with the correct partnerships and economics that it would be better for New Zealand to deploy 5G (densified) infrastructure once and not 2 or 3 times. There would be no value in replicating the existing cellular footprint given an open access deployment of 26Ghz small cells is totally achievable.
With that stated the economics of densifying 5G appears less obvious in New Zealand to other global areas as we as a nation will have very significant capability to provide exceptionally high-speed communication into 87% of all buildings nationally which can already be wirelessly distributed through WiFi. Enable would seek to form a collaborative arrangement with existing cellular providers to seek to establish a sustainable investment model.

Q9 Do you agree that the 31.8 to 33.4GHz, 40.5 to 42.5GHz and 42.5 to 43.5GHz bands are a low priority for allocation to 5G in New Zealand?

Enable has not investigated these spectrum ranges, significant pioneer research and trialling of technology and propagation is required beyond the scale that Enable has the ability to invest in. Internationally the thrust has been in the trailing and tuning in the 3.4, 26 and 28GHz bands. The 30-60GHz bands having a focus on Corsshaul/XHaul Given available spectrum ranges and global testing focus 26Ghz appears the most prudent densification spectrum in the near term.

Q10. When do you think equipment is likely to become available in the bands identified in Q9?

No Comment

Q11. Do you have any comment on the possible allocation of 27.5 to 29.5 GHz to IMT?

The global marketplace is seeing a drive to include additional frequency bands to support 5G demands, such as the 28 GHz band (3GPP band n257), band n257 (26.5 to 29.5), overlapping band n258 (24.25 to 27.5). It is understood this is supported by the GSMA with some testing globally occurring under existing mobile allocations in the ITU's Radio Regulations. The combination of bands would clearly provide broader collective spectrum options for deployment. We note 28Ghz is already being deployed and trials in a number of regions including the USA, Canada, Korea and Japan. There is also evidence that handsets may well be available in this band prior to 26Ghz in particular, due to the speed that many trials have been completed and commercialisation is now being approached in the USA.

Q12. Is there demand for alternative uses other than IMT of the 1400 MHz band? If so, what uses?

No Comment

Q13. When is the demand likely

No Comment

Q14. Is there a need for more sub 1 GHz spectrum for IMT/5G?

Yes. Opportunity should be afforded to those willing to deploy infrastructure to support IoT on a more mission critical basis to obtain private allocations of sub 1GHz spectrum at rates which encourage such innovation.

Q15. If so, how should we deal with radio microphones in the 600 MHz band? Q16. for When is the demand likely to require reallocation of the 600 MHz band to IMT, if at all?

With 600 MHz being widely deployed in preparation of long range infill 5G there is clearly value in this spectrum to a 5G assignment noting that radio microphones have only just been moved into this band which is clearly problematic.

Q17. Which allocation methodology should be used for allocating spectrum bands identified for use with 5G? Why?

Enable's view is that the spectrum should be allocated by administrative allocation.

With that stated, Enable believes that the length of tenure of allocation to some spectrum ranges (particularly those targeted at high speed densification and long rang low latency IoT) needs to be reduced to foster a more dynamic and innovative retail environment. Long term tenure only makes sense in the context of there being a likelihood of little market change and yet with 5G there is the potential for very significant market change in certain vertices (although probably not in national voice and general mobility data services).

Enable believes that MBIE should consider as an integral part of an administrative allocation the viability of an alternative spectrum allocation and payment methodologies which seek to reduce the root industry drivers which dictate operators requiring long term exclusive tenure of spectrum.

Enable proposes MBIE considers the following:

- The methodology being supportive and encouraging an open network or neutral host deployment to decouple the infrastructure expenditure.
- Spectrum revenue to be approached relative to use and short-term reservations rather than long term fixed allocations and options for spectrum being more dynamically allocated and brokered relative to demand. Enable notes that industry sharing has already been undertaken globally through MORAN (Multi Operator RAN) and MOCN (Multi Operator Core Network) implementations and 5G affords new possibilities and facilities for spectrum aggregation and sharing. These aspect of 5G require detailed consideration in collaboration with the industry in addition to other implementation maters.

There appears to be a tendency to think of available spectrum and then seeking to work out how many times it can be split to support operators relative to their likely long-term use (support up to X operators). If one considers as an assumption that the spectrum allocation is sufficient to support the end user demand (at least in the near term) however then there would be enough spectrum for any number of operators (based on actual usage) the market simply based on how much of that demand they attract to use that spectrum providing the spectrum could be dynamically or periodically be allocated.

If it is deemed that such shared management of spectrum is not practically achievable then Enable would propose consideration that indirect access to spectrum is required as a condition of spectrum holding by way of a requirement to offer open access products which may incorporate a spectrum usage charge element and infrastructure overhead cost (on an equivalence basis).

First come first served and lottery allocations, although non-discriminatory, make no sense to Enable and are potentially damaging to the economy. NGWS will be a critical component of the nation's infrastructure and the spectrum which supports it must be made available to those which will be effective in establishing and maintaining market and infrastructure in a timeframe aligned to national needs and development.

Allocation on the highest bidder basis also makes little sense to Enable in a 5G context. This makes more sense to the preceding two methodologies as one could reasonably assume that the party with the highest bid may likely have (a) a significant interest in ensuring that infrastructure would be deployed to return value in its investment (b) and likely to have the requisite scale and funding to successfully establish the infrastructure. Also, clearly this mechanism returns the highest monetary value back to the economy in direct spectrum payments, although whether this returns the best value in relation to other social and innovation value measures would be debatable. The primary issue here is that such an allocation is in Enable's view discriminatory and affords little consideration for innovators who may in time grog very important vertical markets. Such a methodology also is that it ''statically" segments the available spectrum for "long periods" providing exclusive rights to a pre-set number of retail providers and thus potentially limits considerably the potential for innovators in niche vertical markets gaining access to 5G at infrastructure levels (companies wishing to invest in wireless infrastructure have nowhere to go if spectrum cannot be obtained and there is little incentive for primary holders of spectrum in the current operating environment to offer retail products that can be used to challenge their markets).

The regime that makes the most sense to Enable is that spectrum be allocated by administrative allocation. In this regard however, the outcomes and criteria governing such an administrative allocation required considerable consideration informed by the commerce commission study to be undertaken on the mobile industry One such outcome that Enable would expect to be a priority consideration given the embryonic nature of 5G would be that new innovator entrants will be able to readily gain access to spectrum either directly or indirectly via open access infrastructure to support both localised and national innovation initiatives.

Currently spectrum allocation is viewed as a static, point in time, matter underpinning and constraining industry direction for many years on forward looking assumptions. It is significantly less likely with 5G that forward-looking assumptions will be correctly predicted and more likely that disruptive new entrants may play a substantive part in 5G innovation. Existing wireless infrastructure owners will understandably likely have a view that long tern certainty is required (through long spectrum exclusiveness) in order to return on capital investment and spectrum fees however in some 5G areas such as densification a more open network implementation by a Neutral Party may provide for a more flexible environment to support evolving innovation and a more balanced investment risk for all retailers.

Of note is that 5G not only brings greater throughput and lower latency but is a complete rethink on how the network resources are allocated to specific slicing to use cases and instances. Network Function Virtualization (NFV), Software Defined Networks (SDN), Cloud Radio Networking (CRAN) allow for end to end network slicing. There will be a readily available platform to support sharing the Radio Access Network (RAN) and potentially spectrum. This is also not a new concept, but rather an

extension of RAN sharing implemented between carriers in a multiple operator radio network (MORAN) and multiple operator core network (MOCN) implementations.

Q18. Should different allocation mechanisms be used for rights for regional providers and national providers? Why?

The answer to this question depends on the primary mechanism of spectrum allocation chosen but, in all cases, regional and even sub-regional (town, rural community, private) use of 5G will be important to ensure that new vertical services market development is not excluded by virtue of being unable to gain access to spectrum allocation.

Many use cases for 5G have little to do with a requirement for national operation and roaming. 5G may be able to be used for localised IoT connectivity solutions without the need for national integration: Localised autonomous Vehicle control, localised robotic or drone vehicle control. Many uses 5G use cases have little relationship to the context of national mobile voice and data provision requiring national network and national spectrum.

With all bands the potential for regional, local and private instances of NGWS services must be supported if innovation and market diversity is to result.

Q19 Should deployment of 5G technology be specified for some or all bands? If not, why not?

Enable is of the view that the bands should be allocated on a technology neutral basis but be required to be for NGWS use.

Q20. What implementation requirements should be specified and how should these be expressed? – time, extent, etc –

As with any new technology deployment reasonable time must be considered both for the logistics of deployment and a buildout based on commercial reasonableness.

Q21. What should be the consequence of non-implementation – lose spectrum, additional payment, other

Financial penalty or use or loose mechanisms are well established forms of discouragement of competitive spectrum stockpiling and poor utilisation which are not in the national interest. The strengths and weaknesses of these are assessable through past application. Given the vastly more dynamic and uncertain nature of 5G, Enable would encourage MBIE to consider development of new model which seeks to reduce the necessity of infrastructure investors to need to seek long term certainty of spectrum allocation to gain exclusivity to mitigate risk of the high up-front cost of the spectrum. If it is considered that national voice mobility and basic national data mobility are already provided over existing spectrum without 5G

Enable believes the focus needs to move to how spectrum set aside for 5G is always available to the maximum degree required to support new market service channels from both incumbents' innovators which require the specific 5G features of very high speed mobile data services, 5G mass device communications, and 5G critical device communication. Enable's view is that innovators and incumbents should be able to equally gain access to spectrum either directly for highly localized purposes (spectrum allocation deploy own private infrastructure) or indirectly (open access to single infrastructure platform) and that spectrum costs would be more beneficially considered as a usage levy fee.

Enable notes consideration of MBIE of spectrum parks or locality pools which may provide for a degree of local deployment flexibility but seem to pre-ordain that the incumbents will remain fundamentally dominant across and note that innovators will open a new localised service channels (requiring the specific 5G services) and become dominant in that channel e.g. autonomous vehicle communication, home gaming.

Q22. Should the implementation requirements be different for regional and national providers? What should these be and why?

The answer to this question depends completely on form of industry and industry regulation which will apply to 5G. If open access is a requirement as with fixed networks, then this becomes less of an issue. If a traditional long term exclusive licensing of spectrum continues as has been the case to date, then Enable would expect the requirements on timelines to deploy would provide greater leniency to deployments in areas with less competition to those where there is strong competition. The rationale behind this being to seek to deter the stockpiling of spectrum which could be otherwise be used by a competitor and providing no value back to New Zealand in being parked.

Q23. Should acquisition limits be imposed on 5G bands? If so, what should these be and why?

The answer to this question depends completely on form of industry and industry regulation which will apply to 5G. If open access is a requirement as with fixed networks, then this becomes less of an issue. If a traditional long term exclusive licensing of spectrum continues as has been the case to date, then the answer is yes. In one form or another it is essential that spectrum to deploy new and evolving NGWS is not constrained in its ownership to a handful of existing private companies and sufficient allocation blocks would need to exist to service current investors and reserve sufficient pools for emergent ones at both private, local, regional and national levels.

Q24. Should acquisition limits be imposed for regional providers? If so, what should these be and why?

The answer to this question depends completely on form of industry and industry regulation which will apply to 5G. If open access is a requirement as with fixed networks, then this becomes less of an issue. If a traditional approach is taken, then restrictions on maximum bandwidth that an entity can hold should still be in place to ensure market competition. Of note that in non-urban deployments the relative bandwidth requirement from demand should be less wide and therefore permit greater degree opportunity for increased number of operators.

Q25. What term should be used for management rights suitable for 5G? Why?

The answer to this question depends completely on form of industry and industry regulation which will apply to 5G. If open access is a requirement as with fixed networks, then this becomes less of an issue.

If a traditional approach is taken, then Enable would strongly encourage MBIE to seek to minimise the root causes of operator requirements to require long term tenure of spectrum to provide certainty (and a limited closed competitive environment) to support payback of spectrum allocation costs and infrastructure. Long term allocation of spectrum without a related open access infrastructure requirement is not suitable to the dynamic communication revolution which is set to unfold.

Q26. Should the 5G bands be re-planned as TDD bands or some bands or parts of bands be retained as FDD? Why?

Clearly both have advantages and disadvantages, FDD being less interference prone than TDD but noting that the matched frequency response of TDD favours MIMO/Beamforming algorithms and is of the greatest value in dense deployment of low power nodes in the higher spectrum ranges and where large contiguous bandwidth is available. The asymmetric nature of TDD and the ability to dynamically alter up and downlink utilisation also brings a number of advantages. TDD would be anticipated by Enable to be a primary consideration for 5G deployment.

Q27. What bandwidth should be used as the basis for allocation? Why?

Based on latest bandwidth provisions in 3.4GHz band in the uk it is anticipated that between 20 to 50 MHz spectrum allocations per operator in 10MHz Blocks would be suitable for initial 5G requirements growing to 40 to 100 Mhz.

The most demanding applications however in the mid-term will be the ubiquitous streaming of 4K and UHD content likely to require between 15 - 25 Mbit/s per stream requiring channel widths through 26 GHz band allocations. Studies are indicative of this leading to an aggregate “dense” city capacity requirement of between 60 - 70 Gbit/s per km2. Anticipated would be channels of 100MHz minimum bandwidth and requirements of multiple 100MHz.

Q28. What out of band emission limits should apply to management rights when first created for allocation? Why?

We leave this matter to be addressed by the equipment vendor submissions.

Q29. Should out of band emission limits be different if the band is technology neutral? If so, what out of band emission limits should be applied?

We leave this matter to be addressed by the equipment vendor submissions.

Q30. How should interference between adjacent frequency 5G TDD networks be managed? Should this be the same for all frequency bands?

We leave this matter to be addressed by the equipment vendors.

Q31. How should interference between different technologies within the same band be managed, if bands are technology neutral?

We leave this matter to be addressed by the equipment vendor submissions.

Q32. Should regional uses be provided for in the 3.5GHz band plan? Why?

Deployment in the 3.5GHz deployment does not require the high densification of 26Ghz deployment and as such could be considered a matter of simple existing cellular infrastructure upgrade. However, the overarching matters such as ensuring openness to spectrum for retail innovation (whether this being through open access infrastructure or the ability to allocate affordable spectrum to innovators) applies to uses cases spanning both this and higher frequency spectrum ranges.

Enable therefore asserts that it is essential NGWS be considered holistically and an industry model established around the access to infrastructure to deliver services rather than the technical considerations. With all bands the potential for regional, local and private instances of NGWS services must be supported if innovation and market diversity is to result.

	3.5GHz	**26GHz**
Potentially supports new innovation retail solutions	Yes	Yes
Open access required to support market competition and innovative unconstrained retail and community developed private networks.	Yes	Yes
Without open access spectrum must be available at affordable rates to support innovator retail suppliers and private communication solutions	Yes	Yes
Required to support national and international voice mobility	No	No
Required to support basic rate data mobility	No	No
Able to be supplied from limited incremental enhancement of incumbent cellular provider sites	Generally	Significant densification requirement.
Incremental Fronthaul Requirements	Generally able to be supported by existing fibre services to current sites	Requires significant new fibre fronthaul solution however within the limits of hop latency may be reduced with wireless X-haul.

Q33. If allowed in the 3.5GHz band, how could this be managed or facilitated?

Enable is of the view that regional requirements may take two forms:

(1) As with UFB it is possible that a number of infrastructure providers may be able to contribute to the national fabric if this is economically viable.
(2) Over time localised deployments of NGWS are likely to develop as new vertical sub markets evolve in the use of the capabilities of NGWS to new use cases.

Putting aside the price of spectrum which in Enables view should be relative to the density of potential market and therefore less for regional use and set to encourage innovation, Enable questions why a method of administrative allocation would not also be suitable. Regional and local spectrum licencing will need to consider that, unlike national allocation or type (1) above, other regional or local implementations will evolve over time through innovators that identify new vertical businesses or private consortium needs for localised NGWS. An early example may be rural use IoT for agriculture by local consortiums.

Enable notes in respect of potential to share 3.5GHz spectrum the adoption of a real time 3tier framework where both spectrum in the 3.5GHz range is shared in real time based on rules coordinated by a Spectrum Access System (SAS) automated radio spectrum coordinator. 150MHz of CBRS spectrum is dynamically shared in a manner which protects higher-tier users from lower-tier users and optimizes the use of the available spectrum. Accordingly, with appropriate investment spectrum could be more efficiently allocated on a dynamic basis based on prioritisation rules and actual demand.

Q34. Which alternative bands may be suitable for regional allocation? Why?

No Comment.

Q35. Is early access to the 3.5GHz band required for roll out of 5G networks prior to the expiry of existing rights in 2022? If so, why?

Other than the fact that globally a race has started in the deployment of 5G and we would expect for the cellular operators in New Zealand to want to make marketing-based announcement in a period not too distant apart from one another, there seems no compelling requirement to accelerate 5G deployment in New Zealand other than in trials. Enable is of the view that the period is best spent in methodically ensuring that the telecommunications industry (as a whole both cellular and fixed) is set is set up for success and innovation in this coming fourth industrial revolution through careful consideration and planning and regulatory recalibration which ensures that there is equal playing field in the provision of NGWS and fixed services (noting the two are anyway becoming significantly overlapped other than mobility).

Q36. How could early access to the 3.5GHz band be achieved?

It is noted that in addition to Crown allocations, Vodafone, Kordia, Inmarsat and to a lesser degree, Spark have existing holdings in this band. Matters on how spectrum could be reallocated lie between the Crown and the existing right holders.
We note the upper part of the 3.5 GHz band (3589 to 3700 MHz) is allocated to fixed satellite services (in the space-to-earth direction) and is largely unused. The only use is for a satellite gateway earth station in north Auckland. Potential would appear to exist for testing and negotiating the freeing up of localised use of spectrum in this area in areas geographically distant from the land station.
If licenses have not been utilised by existing holders of Crown rights as stated there would appear to be the opportunity of negotiation in respect to whether these rights are likely to be used with the holders and an avenue to re-farming.
We note the information provided is relatively silent on the existing large holdings of spectrum by Vodafone and Kordia and to a lesser extent Spark and the current utilisation and or restrictions of these holdings. It is thus unclear to what degree negotiation is possible across these.

Q37. Should the government be involved in early access arrangements for the 3.5 GHz band?

Yes. It is not the band itself that is the matter at hand it is the fact that 3.5 GHz will signal the first spectrum allocated for the delivery of NGWS through 5G.
All industry matters such as rural, local, private access and considerations for the duration and method of spectrum licensing and or the requirement or not for open access of infrastructure to enable indirect access to the spectrum, or joint spectrum holding, and real time management need to be considered for the benefit of New Zealand innovation and establishment of open market for NGWS.

Q38. Is early access to the 26 GHz band required for roll out of 5G networks prior to the expiry of existing rights in 2022? If so, why?

No. Enable does not envision access to 26GHz being of any significant national importance until post 2022. We would not be surprised if vertically integrated cellular operators would seek to accelerate this and seek to leverage early markets in fixed wireless which would (a) use reasonable traditional organisational workflows (b) have familiarity with end users and (c) have available customer premise equipment ahead of 5G mobile devices. However, with this said this is of little benefit for end users or New Zealand generally due to the very high availability of fiber into homes (New Zealand being already within the top 10 nations globally for the breadth of this coverage). We certainly can see no national benefit that would necessitate public money being spent to clear spectrum purely to support these private company interests.

It is likely that vehicle entertainment systems will be established in high end vehicles capable of individualised (per seat) high definition streaming entertainment. However, this needs to be considered relative to the fact that although an increasing volume of traffic will derive from wireless devices with hardwired devices diminishing the proportion of all traffic which is consumed will remain in 2021 predominantly (83%) consumed from a fixed location i.e. non-Mobile.
When 87% of New Zealand fixed locations will have a direct fibre option in 2022 which when coupled with a gigabit Wi-Fi router (e.g. Wave2) can offer the highest consistency and performance, there is little argument for the need for acceleration of 26GHz densification in New Zealand. The question is then whether 26GHz densification could assist supply the remaining 13% of the population. However, 26GHz is most likely to be deployed in urban densified areas and so unlikely also to resolve this issue.

Q39. How could early access to the 26 GHz band be achieved?

There is no economic justification for seeking to open 26GHz Spectrum early for commercial use. Enable is of the view that availability of 26GHz spectrum is important for non-commercial trial (engineering and cost forecasting) purposes. We see no value to New Zealand in accelerating the availability of 26GHz spectrum already under issue for deployment of commercial 5G densification given the New Zealand context of already very high access to high speed fibre to the home (an early deployment use case of 26GHz 5G). We are certainly of the view that public money spent in freeing up spectrum early would be inappropriate.

Q40. When is demand for the bands above 30 GHz likely to eventuate?

No Comment.

Q41. When is demand for the 600 and 1400 MHz band likely to eventuate, if at all?

No Comment.