

Digicel (PNG) Limited
PO Box 1618
Port Moresby NCD 121
Papua New Guinea
www.digicelpng.com

15 April 2021

Mr Kila Gulo-Vui
Chief Executive Officer
National Information & Communications Technology Authority
Punaha ICT Haus
Frangipani Street
Hohola
National Capital District

By Email and By Hand Delivery

Dear Sirs

Public Consultations viz 800 MHz Draft Band Plan, 2.6 GHz Draft Band Plan and IMT 2020 (5G)

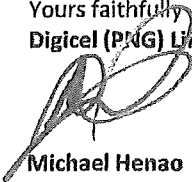
Thank you for the opportunity to provide comments in relation to the above three public consultations.

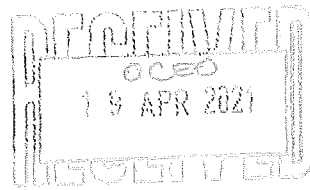
Digicel is pleased to make three detailed and comprehensive submissions respectively, which are enclosed with this letter.

We trust that you will find Digicel's comments helpful, and would welcome any further opportunities to discuss our views.

Should there be any questions, please do not hesitate to contact us.

Yours faithfully
Digicel (PNG) Limited


Michael Henao
Head of Legal & Regulatory



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1 Executive Summary

Digicel welcomes this opportunity to respond to the public consultation on "Draft Band Plan 2.6 GHz" conducted by the National Information & Communications Technology Authority of Papua New Guinea ("NICTA"). As the leading provider of telecommunication services in Papua New Guinea, Digicel welcomes this opportunity to share its global experience around spectrum management and related matters.

As requested, in this submission Digicel provides comprehensive comments and feedback on NICTA's proposals contained in the Draft Band Plan, which can be summarised as follows:

1. The choice of a combination of band 7 and band 38 is a natural choice which other countries have adopted. However, Digicel believes that mixing TDD and FDD technologies gives rise to co-ordination issues. In fact, the use of band 38 in many countries has not happened despite regulatory aspirations.
2. The presence of the TDD band, band 38, causes interference to band 7. The use of within band 38 guard bands reduces the amount of band 38 spectrum available.
3. High power band 7 base stations can interfere with the band 38 TDD services. Enhanced emission controls giving rise to additional base station costs are required.
4. Band 7 emissions can impact radar and position location services above 2700 MHz. OOB emission controls are required on band 7 to reduce this issue.
5. Multi operator licensing in the combined band introduces inefficiencies in the use of the band and ultimately reduces the system capacities of the band.
6. As an alternative, Digicel believes that an alternative band plan, band 41 will lead to enhanced benefits to operators compared to the planned mixed FDD/TDD plans as:
 - There will be no loss of spectrum to inter-system guard bands;
 - Operators can deal effectively with traffic asymmetry;
 - Average powers are lower in TDD systems, leading to reduced OOB emission issues, and
 - With 194 MHz of TDD spectrum, larger per operator allocations can be accommodated.
7. Digicel believes that NICTA should adopt a needs-based approach to allocating spectrum in Papua New Guinea instead of allocating equal amounts of spectrum to all licensed operators. All spectrum allocations should be fully justified, and a firm use-it-or-lose-it policy should be implemented and enforced.

Further details are provided in the remainder of this document. Digicel would be more than happy to discuss with NICTA anything that is unclear or to further explore any of the ideas.

2 Introduction

Digicel welcomes this opportunity to participate in the public consultation on “Draft Band Plan – 2.6 GHz” and to provide feedback and comments as requested.

3 Background

The draft band plan contains proposals to implement band plans for the 2500 and 2600 MHz bands in Papua New Guinea. These plans are a combination of the 3GPP bands 7 and 38.

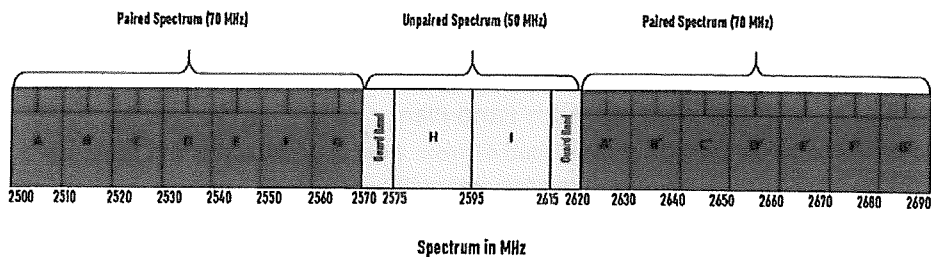
Band 7:

2500-2570 (UL) paired with 2620-2690 MHz (DL). This is an FDD or paired arrangement of 70+70 MHz.

Band 38:

2570 to 2620 MHz. This is a TDD arrangement of 50 MHz in the duplex spacing of band 7.

This arrangement is shown in the Diagram below.



This FDD Duplex spectrum and TDD spectrum will be available for use by mobile operators to implement 4G services as well as 5G services.

4 Comments and Feedback

4.1 Welcome Development

As the previous holder of licensed spectrum in the 2500 and 2600 bands, Digicel welcomes this development to define IMT bands in the former MMDS band. The proposed option 1 of a mix of band 7 and band 38 is one possible option but Digicel believes there are issues with this proposal that will affect the use of the band plans.

4.2 TDD to FDD Interference

This combination leads to interference possibilities at the TDD/FDD interfaces. Indeed, the consultation document recognises this and proposes that any guard band requirements will be accommodated within band 38, reducing it from 50 MHz. This approach unnecessarily sacrifices otherwise excellent mobile network spectrum. Other countries including the UK considered reducing transmission powers in the TDD band to protect the FDD band, but this has in effect resulted in Band 38 being abandoned.

4.3 FDD to TDD Interference

The high-powered base stations downlink signals above 2620 can seriously affect the TDD band. This is recognised by ACMA in Australia where a revised and stringent emission mask has been imposed on the FDD band. This affects the cost and availability of base station equipment such as duplexers. The UK has adopted a similar approach which many suppliers struggled to adopt. These enhanced emission requirements are shown in the Telstra license from Australia which is appended hereto, as is a copy of the Vodafone license in the UK showing the enhanced OOB requirements there.

4.4 Interference to Radar Systems and Positioning Systems Above 2700.

Services in the 2500 and 2600 band can produce OOB emissions that can affect radar services above 2700. This leads to the definition of an enhanced OOB emission requirement to protect these services.

4.5 Effects of Multi-Operator Licensing

If band 7 and probably band 38 are adopted, there will be sublicensing among several operators. This will limit individual allocations and compared to a TDD only service with possibly larger per operator allocations, will support lower system capacities. A non-mixed FDD/TDD band plan will yield the highest possible network capacities, reduce issues with system interfaces and so forth. Operators can set their own service symmetries to maximise traffic flows rather than using FDD spectrum and having underutilised UL system capacities.

4.6 Benefits of an Alternative TDD Only Band Plan

Digicel believes that a TDD only band plan, Band 41 from 2496 to 2690 will be a much better option for Papua New Guinea. This arrangement can commence life as a 4G-only band with easier transitions to 5G services as required. In our view:

- There will be no loss of spectrum to inter-system guard bands;
- Operators can deal effectively with traffic asymmetry;
- Average powers are lower in TDD systems, leading to reduced OOB emission issues, and
- With 194 MHz of TDD spectrum, larger per operator allocations can be accommodated. This ensured the maximum possible spectrum efficiencies in Papua New Guinea.

TDD systems supporting multiple operators require synchronisation and Digicel would be more than happy to discuss providing a common reference synchronisation signal for all Papua New Guinean operators.

4.7 Spectrum Allocation Policies

Traditionally, spectrum has been allocated in Papua New Guinea on an equal basis to each operator, such that bands are split evenly between TPNG/Bmobile and Digicel whilst keeping provision for a third operator. The 900 MHz band started on this basis with 11.6 MHz per operator but is now split evenly between TPNG/Bmobile and Digicel. The 1800 band is similarly divided, as is Band 28 with a provision of 15 + 15 MHz for each of the three operators which are TPNG/Bmobile, Digicel and the new entrant ATH. These allocations have absolutely no correlation with the spectrum requirements of the operators concerned. These allocations are more of a right with some operators underusing their allocations, while others are screaming out for more spectrum to meet the demands in their networks. Some Papua New Guinean operators are not even using the spectrum that has set aside for them, as is the case with the TPNG/Bmobile band 28 allocation. Such has been the stifling predicament for a number of years now.

Papua New Guinea has emerged as a mature network country, with two operators approaching 14 years. It is time that spectrum availability matched the requirements and demands of operators.

There is no place for any sentiment that operators have matched spectrum allocations, irrespective of the network demands.

International reports as well as domestic reports put Digicel's share of the Papua New Guinean mobile market in the low-to-mid 90% figures. So, with 3 million subscribers this means the current competitor in Papua New Guinea to Digicel, viz. TPNG/Bmobile, will be operating with subscriber numbers in the couple of hundred thousand. These disparate subscriber bases simply cannot have the same spectrum demands to meet the requirements of the subscribers, so why should they have the same spectrum allocations?

Once an appropriate 3GPP band structure has been decided for the 2600 MHz band in Papua New Guinea, Digicel urges NICTA to adopt a strict demand basis as the award of any 2600 MHz spectrum.

Appendix 1: Copy of Telstra License showing enhanced OOB requirements in Australia.



9469878.pdf

Appendix 2: Enhanced OOB Emission Requirements of Vodafone License in the UK



OFCOM 800M &
2600M.pdf

DIGICEL (PNG) LIMITED

Submission to NICTA

Public Consultation on Spectrum Identified for IMT 2020 (5G)

in Papua New Guinea

15 April 2021

***This submission is provided to NICTA for the purpose of the current public inquiry
only and may not be used for any other purpose***

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1 Executive Summary

Digicel welcomes this opportunity to respond to the public consultation on “Spectrum Identified for IMT 2020 (5G) in Papua New Guinea” conducted by the National Information & Communications Technology Authority of Papua New Guinea (“NICTA”). As the leading provider of telecommunication services in Papua New Guinea, Digicel welcomes this opportunity to share its global experience of spectrum management and related matters.

As requested, Digicel has provided in this document comprehensive comments and feedback on the NICTA proposals contained in the consultation document and can summarise these as follows:

1. Digicel believes that NICTA should adopt a needs-based approach to allocating spectrum in PNG instead of allocating equal amounts of spectrum to all licensed operators. All spectrum allocations should be fully justified, and a firm use it or lose it policy should be in place.
2. Digicel agrees with NICTA’s statement that spectrum all across the mobile spectrum bands will be used for 5G. It should be up to operators, using infrastructure including base stations supporting static and dynamic spectrum allocation as to what technologies are deployed within its licensed spectrum allocations in Papua New Guinea. This is supported by the technology neutral approach to spectrum licensing in Papua New Guinea.
3. For the time being in Papua New Guinea, all 5G focus should be on eMBB applications to increase network speeds. Other 5G activities are some years away.
4. NICTA’S approach to ensuring band harmonisation with neighbouring countries and regional partners is absolutely vital. This will ensure continued access to cost effective handsets and services.
5. Digicel believes NICTA’s title for section 5 could be misleading. Instead, Digicel suggests that the mid bands and high bands are referred to as providing wide band 5G services in Papua New Guinea.
6. With respect to the 3500 band, Digicel believes the N78 band approach is appropriate. However, in Papua New Guinea this should cover 3300-3600 giving rise to 300 MHz of possible spectrum and the ability to support up to 3 x 100 MHz 5G channels. This will also ensure separation from the comprehensive C band services above 3600 MHz in Papua New Guinea.
7. In Digicel’s opinion, there is little role for the High band spectrum in Papua New Guinea. Perhaps a light touch licensing regime or a class licensing-based approach can be adopted in these bands.
8. Digicel welcomes NICTA’s statement supporting trials and evaluations and ensuring spectrum is made available in a timely manner.
9. Digicel totally rejects any NICTA policy to limit or cap spectrum allocations. All spectrum allocations must be on a needs basis with full justifications and commitment to rollout timescales and so forth. Robust “use-it-or-lose-it” policies must be implemented and enforced, and there should be no legacy allocations which remain unused. If an operator needs and can justify whatever percentage of the available spectrum, then it should be available to them.

Further details are provided in the remainder of this document. Digicel would be more than happy to discuss with NICTA anything that is unclear or to further explore any of the responses.

2 Introduction

Digicel welcomes this opportunity to participate in the public consultation on “Spectrum Identified for IMT 2020 (5G) in Papua New Guinea” and to provide feedback and comments as requested.

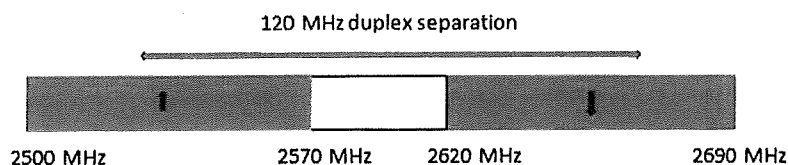
3 Background

The consultation document proposes band plans or channelling plans for the mid bands of 2600 and 3500 MHz as well as the high bands of 26, 40 and 66 - 71 GHz. The 2600 band proposals are already documented in the separate 2600 band plan consultation document and repeated here. Some accompanying policies and approaches to spectrum licensing are also documented for discussion.

NICTA is proposing the following channelling arrangements in the mid band 2600 and 3500 MHz bands and the 26, 40 and 66-71 GHz bands.

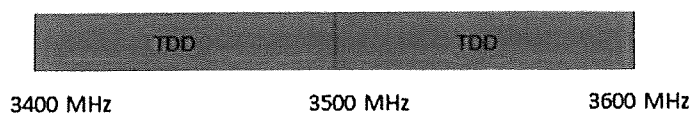
3.1 2600 MHz Band

Organization	Frequency Arrangement Number/3GPP Band Number	Paired arrangements			Un-paired Arrangements (TDD) (MHz)	Duplex Mode
		Mobile station transmitter (MHz)	Base station transmitter (MHz)	Duplex separation (MHz)		
ITU (M.1036)/3GPP	C1 /n7	2 500-2 570	2 620-2 690	120	2 570-2 620	FDD & TDD



3.2 3500 MHz band

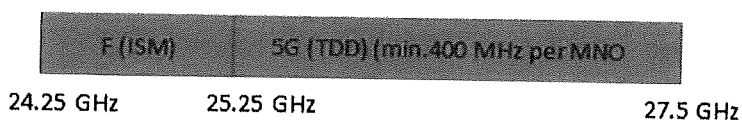
Frequency Band	3GPP Band Number	Frequency Range	Duplex Mode
FR 1 (sub-6 GHz)	n78	3.4-3.6 GHz	TDD



3.3 26, 40 and 66-71 GHz Bands.

26 GHz: (24.25 – 27.5 GHz)

Frequency Band	3GPP Band Number	Frequency Range	Frequency Identified for 5G in PNG	Duplex Mode
FR 2 (above-6 GHz)	n258	24.25-27.5 GHz	25.25-27.5 GHz	TDD



40 GHz: (37 – 43.5 GHz)

Frequency Band	3GPP Band Number	Frequency Range	Duplex Mode	Remarks
FR 2 (above-6 GHz)	n259/n260	37-43.5 GHz	TDD	Future 5G use

66-71 GHz:

Frequency Band	3GPP Band Number	Frequency Range	Duplex Mode	Remarks
FR 2 (above-6 GHz)	<i>N/A at this stage</i>	66-71 GHz	TDD	3GPP standard yet to be developed

4 Comments and Feedback

Digicel has extensively reviewed the draft proposals for these mid and high bands and would like to provide the following feedback and comments on the draft document.

4.1 Spectrum Allocation Policies

Traditionally, spectrum has been allocated in Papua New Guinea on an equal basis to each operator, such that bands are split evenly between TPNG/Bmobile and Digicel and keeping provision for a third operator. The 900 MHz band started on this basis with 11.6 MHz per operator but is now split evenly between TPNG/Bmobile and Digicel. The 1800 band is similarly divided as is Band 28 with a provision of 15 + 15 MHz for each of the three operators which are TPNG/Bmobile, Digicel and the new entrant ATH. These allocations have absolutely no correlation with the spectrum requirements of the operators concerned. These allocations are more of a right with some operators underusing their allocations while others urgently need more spectrum to meet the demands in their networks. Some Papua New Guinean operators are not even using spectrum set aside for them, as is the case with the TPNG/Bmobile band 28 allocation. This has been the stifling predicament for a number of years now.

Papua New Guinea has emerged as a mature network country with two operators approaching 14 years. It is time that spectrum availability matched the requirements and demands of operators.

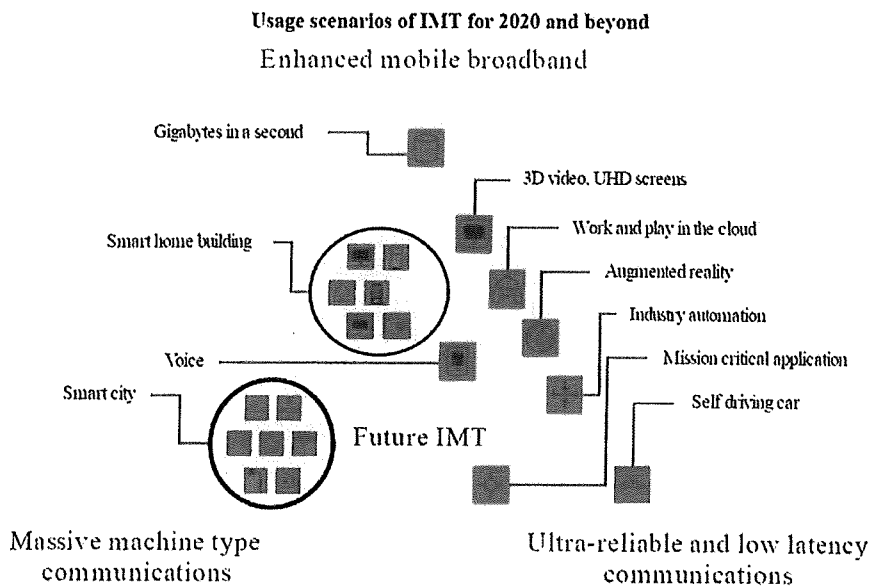
There is no place for any sentiment that operators much have matched spectrum allocations, irrespective of their network demands.

International reports as well as domestic reports put Digicel's share of the Papua New Guinean mobile market in the low to mid 90% figures. So, with 3 million subscribers, this means the current competitor in Papua New Guinea to Digicel, TPNB/Bmobile will be operating with subscriber numbers in the couple of hundred thousand. These disparate subscriber bases simply cannot have the same spectrum demands to meet the requirements of its subscribers so why should they have the same spectrum allocations?

So once appropriate 3GPP band structures has been decided for these bands in Papua New Guinea, Digicel urges NICTA to adopt a strict demand basis for the award of any 2600 and 3500 MHz spectrum.

4.2 Section 3. 5G Spectrum Requirements

These three usage scenarios are indeed the main usage drivers for 5G services and are usually depicted using a Triangle based diagram as shown in the ITU diagram below.



N.1883-02

It would fair to say that the focus of deployed 5G networks to date has been very much concentrated on the eMBB activities or faster internet/broadband speeds and higher capacities. However, evidence has been presented for some major cities that multiband 4G networks can in certain circumstances offer higher speeds. It very much depends on the relationship between the 5G channel width, and the number of frequencies bands being used to deliver CA 4G services.

Current thinking with respect to mMTC and uRLLC activities is that these are at least 5 years away, as they will rely on virtualisation support as well as vertical slicing etc and these developments are some years away.

Digicel believes that - given its wealth of knowledge and understanding of the Papua New Guinean market and the behaviours of its subscribers - that the main focus in Papua New Guinea for years to come will be eMBB services or faster internet/broadband services which will rely on large RF channels (~100 MHz wide). This should be encouraged by NICTA with all adopted band or channelisation plans.

Digicel agrees with NICTA that 5G will need spectrum across the entire mobile band in Papua New Guinea and not just in the mid or high bands mentioned here. The current spectrum licenses, being technology neutral, will enable mobile operators in Papua New Guinea to adopt 5G services in any of their licensed bands as and when they wish to introduce 5G services in these bands. This technology neutral approach is even more important with base stations able to support both static and dynamic spectrum sharing where the actual RAN technology chosen is dictated by the traffic carried and can switch between 4G/NR etc.

Digicel agrees that it is imperative that these mid bands are used to ensure operators have access to wide band channels, of at least 100 MHz. This will allow them to maximise the benefits of the enhanced traffic carrying capabilities of 5G.

4.3 Section 4. 5G Band Specification

Digicel agrees that band harmonisation is absolutely vital. This will ensure the people of Papua New Guinea have access to the lowest cost mobiles, using regionally harmonised spectrum and bands while also being able to support roamers with the region.

4.4 Section 5. Bands Identified for IMT 2020 (5G) in PNG

The opening sentence is confusing and misleading. This states that bands identified for IMT 2020 (5G) in Papua New Guinea are in the mid and high bands. Why?

Digicel believes that these high and mid bands should of course be used to support 5G services in Papua New Guinea, but all other bands will also - at the discretion of the operators - be available for use for 5G services. It should be up to operators to decide, based on their network demands, what bands support which technologies etc. within their networks. Indeed, as mentioned above, base stations can support static and dynamic band sharing so will be able to switch between RAN technologies so an operator could decide to support a 5 MHz 5G channel in say band 28 or band 8 within their allocation.

In order to avoid confusion about 5G services only being supported in the mid and high bands, Digicel believes the first sentence be changed to:

Consistent with ITU WRC-19 Global IMT Band identification, bands identified to support wide band 5G channels in PNG are in the mid-band and high band.

This avoids confusion with lower bands where narrow band 5G channels can also be implemented.

4.4.1 Mid-Bands

Digicel's feedback on the proposals for the 2600 mid band are contained in the 2600 band response document. In summary, Digicel believes that the proposed band 7 channelisation plan for the 2600 band is not the best approach for Papua New Guinea. A far better approach, which will yield higher capacities per MHz, would be to adopt an N41 or B41 all TDD band plan. This band plan will initially support 4G services with an excellent route to future 5G use.

NICTA's adoption of N78 as the band plan/channelisation plan for the 3500 MHz band in Papua New Guinea is the correct approach for Papua New Guinea.

Digicel understands the issues associated with C band - coexistence for satellite services. Indeed, as the holder of significant amounts of C band satellite spectrum, care must be taken to ensure the 5G use and satellite services use can happen in the same part of the spectrum. N78 is in fact defined from 3300 to 3800 MHz and Digicel believes that in Papua New Guinea, the defined N78 should start at

3300 and reach up to 3600. This leaves significant amounts of C band satellite service spectrum above 3600 MHz while also making available 300 MHz of 5G spectrum.

This Papua New Guinean definition of band N78 can accommodate up to 3 x 100 MHz 5G channels. As stated in Digicel's responses to the 800 MHz and 2600 MHz band consultations and repeated here, Digicel urges NICTA to adopt a spectrum award policy that ensures all spectrum in Papua New Guinea should be allocated on a need basis only. There is no place in Papua New Guinea for legacy allocations or dividing up spectrum equally between operators, irrespective of their needs for the spectrum. All allocations must be on a needs basis with full justifications and commitments to rollout plans and timescales. Any failure to use any allocation should result in spectrum recovery under a "use-it-or-lose-it" policy, and making unused spectrum available for other operators who need it.

On a final note, with respect to this 3500 MHz mid band spectrum, Digicel understands that there is significant unauthorised use of this band in Papua New Guinea. This spectrum is used to support PTP and PTMP links, often supporting corporate services. NICTA must ensure that robust steps are taken to close down any such use of these bands so that they can be made available in an interference-free manner to potential licensed users.

4.4.2 High Bands

There has been significant industry hype associated with the use of these high bands for 5G in many countries around the world. There have been spectrum auctions, spectrum awards etc and extensive testing and evaluation have occurred, but it is fair to say that these bands are not particularly wide area RAN spectrum use friendly. Coverage footprints are extremely small giving rise to the need to deploy significant amounts of RAN infrastructure to achieve any meaningful service footprint.

Papua New Guinea is a very adverse country in which to deploy radio networks. There is significant dense foliage, high humidity, heavy rainfall and much of the country is rural with many inhospitable regions. Perhaps more than any other operator, Digicel is well aware of the challenges of deploying a RAN network in these situations and all the associated infrastructure and operation and maintenance costs involved.

Digicel does not believe there is any requirement for these high bands in Papua New Guinea for use in the deployment of RAN networks.

Should NICTA wish to define these bands and still make them available for some potential use in Papua New Guinea, then perhaps a class licensing approach or a light touch licensing approach would be appropriate.

4.5 Section 6. Papua New Guinea Implications and Considerations

Digicel would like to comment on the 6 bullet points in this section as follows:

Bullet #1 mentions that the lower bands in Papua New Guinea have all been allocated to 2G/3G and 4G services so this mid band and high band spectrum has to be used for 5G services in Papua New Guinea. Digicel believe this is an incorrect assumption/policy statement. The licensed spectrum in Papua New Guinea is licensed on a technology agnostic basis and it should be up to operators how they use their spectrum and to support which technologies and when. It is perfectly possible that some Papua New Guinean operators will implement 5G services in the low bands such as B8 or B28, perhaps instead of existing 2G services, 3G services or alongside existing 4G services. Base stations capable of supporting static or dynamic spectrum sharing will quickly move the discussion away from bands and specific technologies to bands supporting different technologies on a dynamic basis.

Digicel fully supports the statement in Bullet #2 about trials and evaluation exercises in the mid band spectrum, and possibly the high band spectrum too. Indeed, Digicel recently requested test spectrum from NICTA in the 2600 band to undertake such 5G evaluation trials and this was – regrettably – refused by NICTA. How can such trials take place when NICTA will not grant spectrum licenses, even on the temporary basis that Digicel was happy to accept?

Bullet #3 about making spectrum available in a timely manner is very important but it should be noted that this has not been Digicel's experience when requesting some additional spectrum allocations from NICTA. There is too much prevarication and inability to make decisions. This impacts Digicel's ability to develop technologies and to enable continued economic growth. The spectrum does, after all, belong to the people of Papua New Guinea and it should, therefore, be made readily available for operators' use. Respectfully, some NICTA practices hamper or impede economic development in Papua New Guinea. Going forward, Digicel urges NICTA to be far more proactive in recovering unused spectrum and making it readily available, on a justified basis, to those operators that need it. Legacy spectrum allocations should be a thing of the past.

Bullet #4 concerns possible licensing approaches for the High band spectrum. However, Digicel believes that there is little need for this spectrum in Papua New Guinea, so perhaps a light touch licensing policy or even a class licensing approach could be adopted. Based on its experiences in other markets around the world, Digicel cannot see these bands being in high demand in Papua New Guinea.

Digicel believes that bullet #5 and the possible approach to spectrum-capping in Papua New Guinea is wrong. Papua New Guinea's spectrum resource should not be capped as this could seriously, and negatively, impact network roll-out and expansion and any ability to ensure continued economic development for the country. Operators should have access to the spectrum they need to maintain and operate their networks with no artificial limits imposed.

All spectrum should be allocated on a needs basis with full justifications and binding commitments to rollout and network construction targets. Spectrum bands or channelisation plans should not be defined on the basis that all licensed operators get the same amount of spectrum. The networks in Papua New Guinea do not have the same spectrum requirements so why should they have the same spectrum allocation? Why should an operator supporting 95% of the total Papua New Guinea subscriber base and with 3 million subscribers be expected to use the same amount of spectrum as an operator supporting several hundred thousand customers? These networks will simply not have the same spectrum demands or requirements and must not be treated the same. Operators' failure to meet committed targets should result in fines and loss of spectrum. Any failure to use allocated spectrum must result in a robust response pursuant to a stern "use-it-or-lose-it" policy.

Finally, on Bullet#6, Digicel is more than happy to co-operate with NICTA defining band and channellisation plans and to share its extensive global experience working with regulators around the world to license and manage spectrum. However, it must be said that there are times Digicel gets extremely frustrated with NICTA policies and approaches to fairly managing spectrum resources. For instance, Digicel could not understand why its request for test and evaluation spectrum at 2600 could not be accommodated. Likewise, why are operators allowed to sit on spectrum allocations which they have absolutely no intention to use save to frustrate competitors? Digicel calls for, and would welcome, a refreshed approach by NICTA to fair spectrum allocation and award, which will be to the benefit of the resource owners: the people of Papua New Guinea. After all, they deserve to see their spectrum used to their maximum possible benefit.

DIGICEL (PNG) LIMITED

Submission to NICTA

Public Consultation on Draft Band Plan 800 MHz

15 April 2021

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may not be used for any other purpose***

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1 Executive Summary

Digicel welcomes this opportunity to respond to the public consultation on "Draft Band Plan 800 MHz" conducted by the National Information & Communications Technology Authority of Papua New Guinea ("NICTA"). As the leading provider of telecommunication services in Papua New Guinea, Digicel welcomes this opportunity to share its global experience of spectrum management and related matters.

As requested, Digicel has provided in this document comprehensive comments and feedback on the NICTA proposals contained in the Draft Band Plan and can summarise these as follows:

- The proposed band plan is not consistent with any current or planned 3GPP band plan. This will affect the availability of compatible devices and should be avoided.
- Given the timescales associated with ensuring new devices support new 3GPP bands, which Digicel believes to be 2-3 years, there would be no compatible devices even if the 3GPP band was defined today.
- Having spent the past 14 years constructing and operating a national radio network in Papua New Guinea and in doing so overcoming many challenges, Digicel believes plans for a new national PPDR network are poorly conceived. Digicel does not believe any such network will materialise in Papua New Guinea.
- As an alternative and consistent with APT policies on PPDR networks, Digicel believes that a co-operative agreement with an established commercial national operator to share their network would be a far better solution for Papua New Guinea. PPDR-commercial network co-operation is fully supported by 3GPP releases and Digicel, as the natural partner network in Papua New Guinea, would welcome the opportunity to discuss this concept further with NICTA and interested parties.
- Digicel believes that NICTA should adopt a needs-based approach to allocating spectrum in Papua New Guinea instead of allocating equal amounts of spectrum to all licensed operators. All spectrum allocations should be fully justified, and a firm use-it-or-lose-it policy should be implemented and enforced.

Further details are provided in the remainder of this document. Digicel would be more than happy to discuss with NICTA anything that is unclear or to further explore any of the ideas.

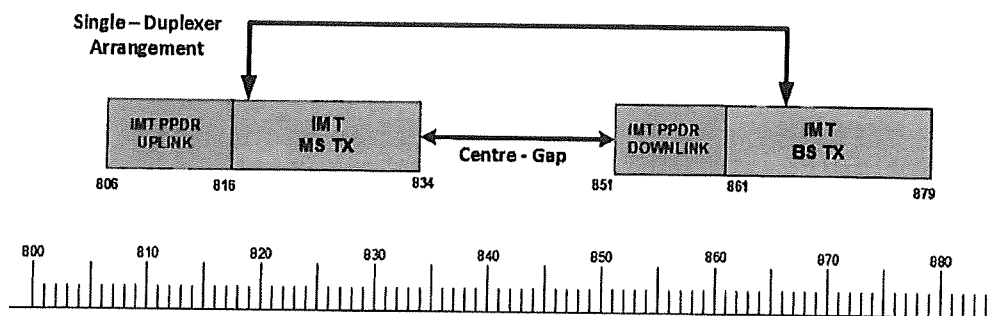
2 Introduction

Digicel welcomes this opportunity to participate in the public consultation on "Draft Band Plan – 800 MHz" and to provide feedback and comments as requested.

3 Background

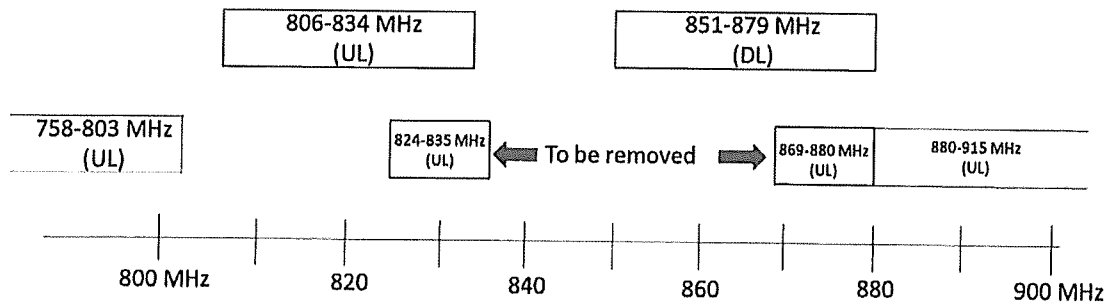
The draft band plan contains proposals to implement a band plan for part of the 800 MHz band in PNG. This proposal is as follows:

Uplink: 806 MHz – 834 MHz. Downlink: 851 MHz – 879 MHz. This is shown in the Diagram below.



This Duplex spectrum allocation of 28 MHz is further divided between a reservation of 10 +10 MHz for PPDR (Public Protection and Disaster Relief) and 18 MHz for public Mobile telephony services. This would be shared between the licensed operators in PNG.

The diagram below shows this proposed band plan against the nearby spectrum allocations in PNG.



The spectrum on the left is the Downlink of band 28 while the spectrum on the right is the uplink of band 8. The current part of band 5 used by the TPNG CDMA service with 11 MHz is also shown. This will be removed as part of any rationalisation of the 800 MHz band.

4 Comments and Feedback

4.1 Lack of 3GPP defined Spectrum Band

The proposed spectrum plan comprising both the PPDR allocation and the commercial Mobile services spectrum does not align with any current 3GPP plan. This means that there will be no handsets available in the market capable of using this spectrum. On this basis, this proposed allocation should be avoided.

4.2 Timescales Associated with Adopting New 3GPP Spectrum Plans

In the event that this band structure is proposed on the basis that a 3GPP band will be defined to cover this, this really is a long-term exercise. In Digicel's opinion, this will take 2-3 years before devices will appear capable of supporting this band. In Digicel's experience, the band plan will be unusable until then.

Even if there is a 3GPP defined plan available at some future date, devices have a limit on the number of bands that they can support. The more popular or international bands will be top of the supported list with specialised or rare bands at the bottom of the list (if they make it on to the list). In all probability, devices for the Papua New Guinean market capable of using this band plan will not be COTS devices but rather bespoke or customized devices with associated price premiums. This is not consistent with having low costs of entry for Papua New Guinea's users.

4.3 PPDR Plans and Dependency on National Network

The PPDR plans in the draft band plan reflect APT thinking and policy on dedicated spectrum for PPDR networks. The stumbling point is that this will require the construction of a national network and this will not be easy in a country such as Papua New Guinea with its challenging terrain. Any national network construction activities will take many years and at what cost? Will this really happen in Papua New Guinea? With Digicel's wealth of experience constructing and operating a national network in Papua New Guinea, Digicel does not believe this will happen.

4.4 Realistic Options for a National PPDR Network in PNG

Digicel believes a new national PPDR network is not a realistic option in Papua New Guinea. Instead, Digicel believes that it would be more prudent to consider some of the other approaches suggested in various APT PPDR guidance and advice documents. A cooperation agreement with an existing commercial mobile operator would be a far more effective plan to achieve a national PPDR network. Latest 3GPP releases support features to allow PPDR networks to share commercial networks while enjoying guaranteed QoS levels, pre-emption and priority access, benefiting from hardened networks as well as a quick-to-market approach. Such networks are now being deployed elsewhere in the world with a very significant undertaking, the ESN network already operational in the UK.

In Papua New Guinea, Digicel would be the natural partner network for any such PPDR plans. Indeed, there could even be provision for a number of temporary sites or COWS, part of the Digicel network that could be deployed at very short notice, by air or sea or land, to support national disasters in locations with no existing coverage.

Digicel would welcome the opportunity to discuss this concept further.

4.5 Spectrum Allocation Policies

Traditionally, spectrum has been allocated in Papua New Guinea on an equal basis to each operator. So bands are split evenly between TPNG/Bmobile and Digicel and keeping provision for a third

operator. The 900 MHz band started on this basis with 11.6 MHz per operator but is now split evenly between TPNG/Bmobile and Digicel. The 1800 band is similarly divided as is Band 28 with a provision of 15 + 15 MHz for each of the three operators which are TPNG/Bmobile, Digicel and the new entrant ATH. These allocations have absolutely no correlation with the spectrum requirements of the operators concerned. These allocations are more of a right with some operators underusing their allocations while others are screaming out for more spectrum to meet the demands in their networks. Some Papua New Guinean operators are not even using the spectrum that has set aside for them, as is the case with the TPNG/Bmobile band 28 allocation. Such has been the stifling predicament for a number of years now.

Papua New Guinea has emerged as a mature network country, with two operators approaching 14 years. It is time that spectrum availability matched the requirements and demands of operators. There is no place for any sentiment that operators have matched spectrum allocations, irrespective of the network demands.

International reports as well as domestic reports put Digicel's share of the Papua New Guinean mobile market in the low to mid 90% figures. So, with 3 million subscribers, this means the current competitor in Papua New Guinea to Digicel, TPNG/Bmobile, will be operating with subscriber numbers in the couple of hundred thousand. These disparate subscriber bases simply cannot have the same spectrum demands to meet the requirements of its subscribers so why should they have the same spectrum allocations?

So once an appropriate 3GPP band structure has been decided for the 800 MHz band in Papua New Guinea, Digicel urges NICTA to adopt a strict demand basis for the award of any 800 MHz spectrum.