



An analysis of EMIR's "Reviewing contentious DNB's 5G"

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| 14/12/2022

1 Introduction

Prime Minister Datuk Seri Anwar Ibrahim has called for a review of the 5G rollout. EMIR² has responded to this announcement by publishing yet another article along side its previous articles³. In this new article EMIR criticises the current single wholesale network (SWN) rollout of 5G in Malaysia and makes a policy proposal to reassign Malaysia's 5G spectrum to the six mobile operators so that they can each build their own 5G access network.

In drafting its article EMIR has demonstrated that it does not understand how the SWN works. For example EMIR:

- assumes that the SWN involves active RAN sharing which makes it impossible for the mobile operators to compete in service innovation at the network level. This is incorrect – there is no active RAN sharing;
- ignores the fact that changing from the SWN to multiple 5G networks will lead to major delays in 5G rollout at a time when Malaysia needs 5G services for economic growth;
- claims that DNB's costs in rolling out and operating the SWN will increase substantially and will not lead to lower end-user prices. In contrast rational economic analysis indicates that EMIR's proposal will lead to wholesale 5G costs 4 to 5 times higher than those of the SWN;
- believes that demand for 5G services will be sluggish and will focus on high-density areas and specialist applications such as improvements in industrial processes (4IR). In contrast experience from elsewhere in the world suggests that the main demand for 5G will come from growth in mobile data services and fixed wireless access services; and
- assumes that the Government will continue to be the major funder of DNB when the expectation is that the Government will contribute only a modest minority share of DNB's required funds by 2025.

If EMIR's policy proposal were to be implemented then Malaysia would face 5G services which:

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² EMIR describes itself as: 'An independent think tank which specialises in developing strategic policy recommendations.'

³ Article 1 *De-constructing 5G rollout in Malaysia Part 1*; Article 2 *De-constructing 5G rollout in Malaysia Part 2*, Article 3 *Malaysian 5G rollout – Exhibit A for misplaced solution*, and Article 4 *Malaysian 5G rollout "unanswerable" questions*.

- are 4 to 5 times more costly at the wholesale level than continuing with the SWN;
- are delayed by many years in Malaysia at a time when 5G is starting to become important as a driver of economic growth elsewhere in the world; and
- offer little or no improvement in network service innovation and infrastructure competition.

For more details please read the full report as follows.

2 Improving rural broadband versus deploying 5G

In its paper EMIR argues as follows:

- The quality and coverage of broadband services in rural areas is poor and is in need of improvement.
- DNB should therefore be repurposed to build passive infrastructure, such as towers and fibre transmission links, in the rural areas. Mobile operators can then use this infrastructure to improve rural broadband by building out their 4G networks.
- DNB's 5G SWN be abandoned and 5G spectrum be reassigned to the six mobile operators for them to build their own individual 5G networks.

We take a different view. We agree with EMIR that there is a role for the Government to help improve rural broadband connectivity. But we also believe that Malaysia needs a 5G network that serves urban and suburban areas of Malaysia as soon as possible. We note that:

- Malaysia lags most of its neighbours and virtually all high income countries, in rolling out 5G networks. (We note that, by the time DNB launched Malaysia's 5G network in late 2021, there were 80 countries with 5G commercial services.⁴ In contrast, Malaysia is ranked 55th in terms of GDP per head⁵. Given this level of income per head, we might have expected Malaysia to have launched 5G services one or two years earlier).
- 5G technology offers faster and cheaper mobile broadband, enhanced IoT connectivity, and a raft of new applications through its low-latency, high-reliability, capabilities. These promises have resulted in Governments around the world prioritising national 5G deployments. Clearly there is a strong global momentum behind 5G.
- Such services are needed to support a wide range of ICT applications (including 4IR⁶) and the development of a world class ICT sector in Malaysia. The 5G deployment is part of a much broader national initiative, set out in Malaysia's Digital Economy Blueprint⁷ that aims to deliver all the elements of the eco-system and digital skills needed. 5G is a key component.
- Demand for mobile data services globally has grown by 25% per annum with slightly higher growth rates in Malaysia. Figure 1 illustrates and shows that 5G networks are important in maintaining mobile data service growth in future.

⁴ <https://www.spglobal.com/marketintelligence/en/news-insights/research/5g-tracker-85-markets-worldwide-have-commercial-5g-services>

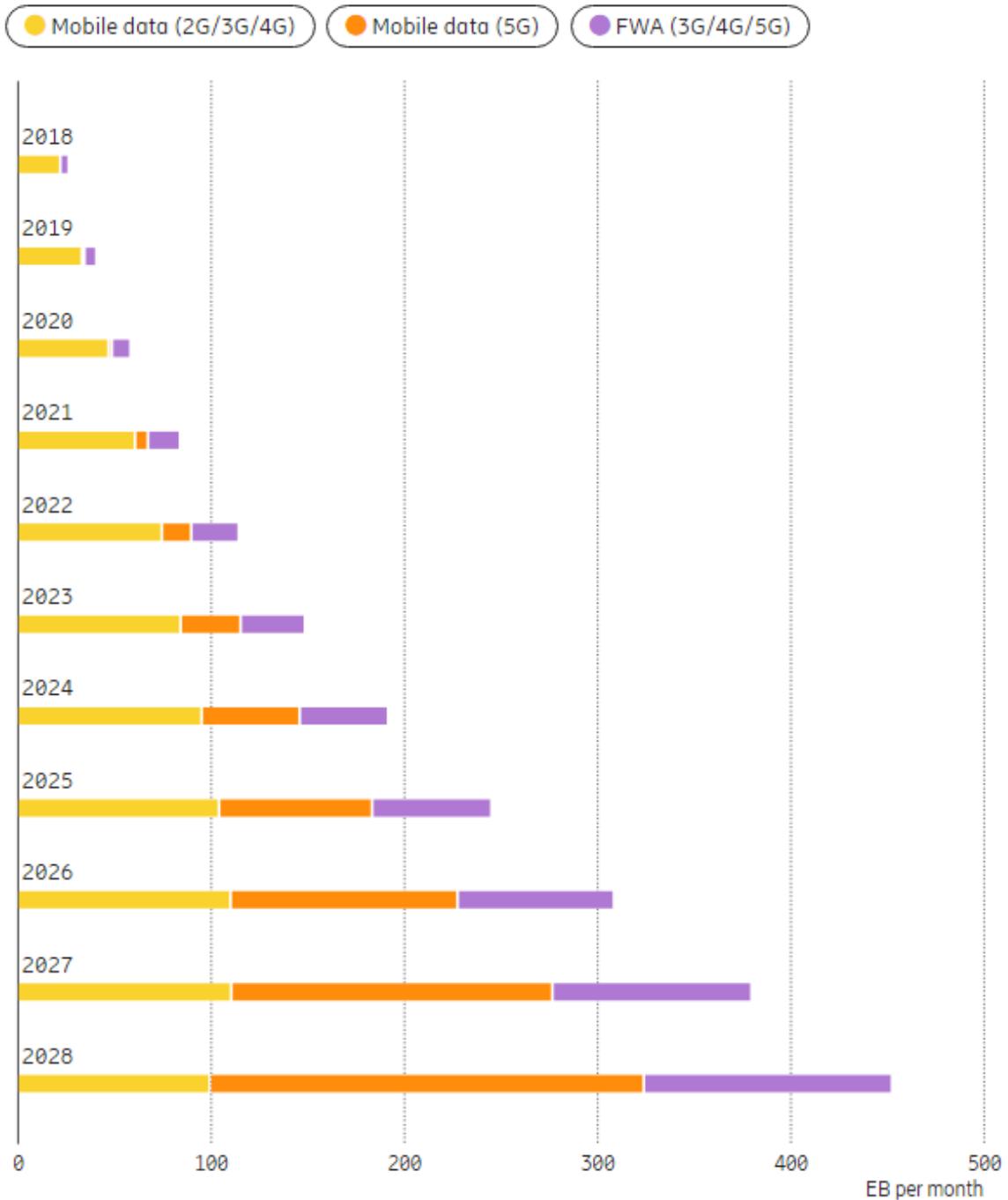
⁵ <https://worldpopulationreview.com/country-rankings/gdp-per-capita-by-country>

⁶ The Fourth Industrial Revolution (4IR) or Industry 4.0, conceptualizes rapid change to technology, industries, and societal patterns and processes in the 21st century due to increasing interconnectivity and smart automation. https://en.wikipedia.org/wiki/Fourth_Industrial_Revolution

⁷ <https://www.epu.gov.my/sites/default/files/2021-03/Malaysia-Digital-Economy-Blueprint.pdf>

- 5G networks offer a lower cost way of meeting this growth in demand than 4G networks. Based on the prices in DNB's reference access offer and MCMC's estimates of the cost of expanding 4G capacity,⁸ we estimate that moving from 4G to 5G using the SWN model lowers wholesale costs per GB of mobile data by around 85%.

Figure 1: Global demand for mobile data⁹



Such considerations lead us to conclude that the Government needs to take initiatives both to roll out 5G as soon as possible and to improve rural broadband services. But we consider that these two initiatives can be

⁸ MCMC, 5 October 2022, Review of Access Pricing Public Inquiry paper, Table 78

⁹ <https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast#:~:text=Total%20mobile%20data%20traffic%20in,in%20average%20usage%20per%20smartphone.>

pursued independently of one another. In this paper we focus on the central issue of the Government's proposed review. What is the best way to rollout 5G in Malaysia?

3 Correcting EMIR's misunderstandings about the current SWN model

3.1 There is no spectrum sharing or active RAN sharing under the SWN model

EMIR claims that there is spectrum sharing and active RAN sharing under the SWN model.

"This apparent aversion to spectrum sharing that we notice in the global 5G rollout experience is critical! This is because the moment spectrum is shared, automatically, the active network equipment must be shared too"

This claim is false. EMIR has misunderstood this important point despite our repeatedly pointing out its mistake in responding to previous EMIR articles.

DNB is constructing a single 5G network with exclusive use of the 5G spectrum. This is a simplified form of the conventional use of the term MOCN as used by "GSMA". Under this simplified form, this spectrum is not shared. There will be one set of electronics, using only 5G technology to carry data between base stations and end-user devices and using only the DNB frequencies. There is no question of linking multiple RANs from different suppliers. There is only one RAN from one supplier. DNB then links its radio network into the core networks of the operators using standardised network interfaces and the operators share the data capacity delivered between their core networks. They do not share within the radio network and they deploy their own core networks.

3.2 Service innovation is carried out by the mobile operators rather than by DNB

Because it assumes active RAN sharing, EMIR concludes that there will be no competition between mobile operators to innovate in terms of developing new network services.

"MNOs can no longer compete on the quality of the network, which is the key differentiating feature, while all other features, including differentiation "on retail end" which DNB keeps emphasising, are only secondary to and dependent on the network quality"

EMIR misunderstands how the SWN works. Each mobile operator will continue to innovate in their core networks in terms of the services offered, whilst buying 5G access at prices well below the cost of 4G access. Granted there will be no innovation in the supply of 5G RAN infrastructure because there is no infrastructure competition in this component of the network. But this innovation is determined largely by the relevant standards bodies and then implemented by the global network vendors.

3.3 The SWN model will substantially reduce mobile data service prices

EMIR claims there will be no reduction in price as a result of deploying the SWN model rather than deploying several 5G access networks.

"the end result [of the SWN model] will be an industry with low competition, innovation and, as a result, low quality and no reduction in price". Our analysis indicates that the SWN is leading to substantially lower deployment costs and hence to lower end-user prices of 5G services when compared with any option based on several 5G access networks. Our analysis is as follows:

- Rolling out six 5G networks – one for each mobile operator - would require six times as many 5G base stations.
- The unit cost per base station may be marginally lower under the six network option. But we estimate that the overall ten-year cost of 5G network ownership under this option will be four to five times greater than under an SWN.
- This means that the end-user prices under the SWN are expected to be around 60% lower than with a deployment of six 5G networks¹⁰.

3.4 The number of cell sites required is determined by a Regulatory mandate

In its Figure 1 EMIR compares the characteristics of 2G, 3G, 4G and 5G network technologies. It concludes that:

- a 5G cell site has less than 20% of the range of a 4G cell site; and
- 36 5G cell sites are needed to cover the same area as one 4G cell site.

This analysis is misleading. The cell radius needed for 5G is determined by a mandate by the Regulator, specifying 100 Mbps download speed at the cell edge. This quality of service requirement means that DNB needs to use 3.5 GHz spectrum to deliver the necessary speeds. The cell radius at this frequency varies significantly by the type of area covered – from around 400 metres in dense urban areas to 3800 metres in the more rural parts of the 80% coverage area. This means that the number of cell sites deployed by DNB for 80% coverage is nowhere near 36 times the number of sites required using 4G technology (which would be unable to deliver the Regulator's mandate on 100Mbps download speeds). DNB estimates that 7500 5G cell sites are needed. This compares with around 23,000 sites currently deployed by the mobile operators to provide their 4G coverage. The key point here is that 5G deployment by each of the six mobile operators would need six times more cell sites than the SWN if the mandated 5G quality of service is to be delivered.

3.5 The number of cell sites required for 90% population coverage is just over 10,000

EMIR claims that DNB will need well in excess of 10,000 cell sites to provide 90% population coverage.

"For example, the proposed 10,000 towers would certainly not be enough to provide projected coverage targets by DNB (90% coverage in populated areas by 2027)".

DNB continues to estimate that just over 7,500 cell sites are required for 80% population coverage. DNB further estimates that around 2,600 additional sites will be needed to extend coverage to 90% of the population.

There is no evidence to suggest that these estimates are faulty. EMIR's conclusion may have validity if, as it assumes, 5G spectrum is not available at 700 MHz. But it is and will be used extensively by DNB to provide coverage as its network is expanded from 80% to 90% population coverage.

¹⁰ This estimate assumes that retail costs for individual mobile operators are 40% of wholesale costs and that this cost element of the retail price does not change when an SWN model is employed instead.

3.6 Continuing with the SWN will lead to a faster deployment of 5G services

EMIR fails in its article to consider the speed of rollout of 5G services - an important factor in determining when 5G services start to contribute to economic growth in Malaysia (as discussed in Section 2 above).

We note here that DNB has reported that it is ahead of schedule in meeting its main rollout target of 80% population coverage by the end of 2024¹¹. It has now reached 40% coverage a year after starting its network deployment and has two more years to cover the remaining 40%.

Changing from the SWN to multiple 5G access networks would involve substantial delay. There are four main elements here:

- Nearly two years of work by DNB would be largely written off.
- Substantial time would be needed to unwind current arrangements and move to individual 5G networks for each mobile operator. For example there would be a need to reassign 5G spectrum and to terminate DNB's contracts with Ericsson, with Telekom Malaysia and with the five mobile operators which are now signed up to DNB's reference access offer for the next 10 years.
- Under EMIR's proposal six times as many 5G cell sites would need to be built than under the SWN model. This creates a problem. Building a cell site requires substantial technical expertise whilst the pool of manpower with these skills is limited. This would inevitably lengthen the time needed for each operator to reach 80% population coverage – well beyond the DNB target date of 2024.
- Moving to multiple networks would mean that each mobile operator would have use of only 1/6 of the 200 mhz of spectrum currently assigned to DNB– that is, about 30 to 40 MHz of spectrum at 3.5 GHz. This would not be sufficient to deliver the 5G data rates the regulator has mandated to. More spectrum could be made available by clearing adjacent spectrum of other users such as satellite. But this would involve a delay of many years, with associated additional costs.

4 Our analysis of EMIR's claims on costing issues

In its article EMIR casts doubt on the reliability of DNB's costings for the SWN. For example:

"DNB's costs are highly likely to be understated (and therefore, its beneficial effect is overrated) due to possible hidden costs that were either not laid out transparently or not considered thoughtfully" and

"RM4 billion as estimated corporate costs over ten years for an entity that nearly owns nothing, does nothing except playing a role of a middleman of a kind, simply suggests itself for more scrutiny and breakdown"

We note here that:

- DNB's costings are fully transparent and included in its detailed business plan which has been approved by the MCMC following detailed scrutiny.
- The plan is based on costs supplied by Ericsson, one of the world's leading 5G equipment vendors. DNB ran an open competition seeking bids to build and operate the network. This was won by Ericsson with materially lower prices than any other bidder. As a highly experienced profit-maximizing organization

¹¹ <https://www.kkmm.gov.my/en/public/news/23277-malaysia-s-5g-rollout-ahead-of-schedule-says-dnb#:~:text=KUALA%20LUMPUR%2C%20Dec%2012%20%2D%2D,Copa%20by%202024%20or%20earlier.>

that is subject to strict contractual conditions, Ericsson is unlikely to have omitted or hidden any significant costs.

- DNB is rolling out its 5G network to serve 80% of the population in three years. This is not the act of an organisation which "nearly owns nothing, does nothing".
- There are start-up costs of around RM 0.8 billion in the RM 4 billion corporate costs. But once these start-up costs are excluded, DNB's corporate costs are in line with other Malaysian mobile operators.

5 Our analysis of EMIR's claims on drawbacks to the SWN model

EMIR claims that the SWN will be substantially inferior to competing networks because, under an SWN:

- Claim 1: *"MNOs can no longer compete on the quality of the network (because they use a shared 5G network)"*.
- Claim 2: *"The end result [of a 5G SWN] will be an industry with low competition, innovation and, as a result, low quality"*.
- Claim 3: *"Being locked with one supplier of such equipment [active radio network equipment] reduces the potential for competitive and dynamic cost reduction over time"*.

We believe that these claims are either erroneous or exaggerated. We note that:

- Claim 1 is based on the assumption that there is RAN sharing under the SWN which prevents network service innovation by individual mobile operators. This is a misunderstanding by EMIR. See 3.2 above.
- Claims 2 and 3 assert that an SWN would lead to weak competition between mobile operators at the infrastructure level. But infrastructure competition would be hard to achieve if, as seems likely, the 5G networks were run by consortia of rival mobile operators. In the case of two consortia:
 - Operators would divide into two groups, ideally with approximately equal market shares.
 - Each group would form a consortium and set up an entity, similar to DNB, to plan and deliver their shared network.
 - Operators would need to provide long-term commitment to their consortium. They would not be able to move from one consortium to another.
 - Each consortium would be a monopoly provider to its constituent operators who cannot leave to join a different consortium. There is therefore little competitive pressure on the consortia.

6 Our analysis of EMIR's claims on international practice

EMIR argues that international experience with 4G SWNs shows that SWNs do not work.

"First and foremost, SWN or DWN models will have an inimical impact on our telecom industry, undermining competition and innovation in terms of network quality which is the paramount feature. The experience of all the countries that tried 4G SWN clearly supports this notion".

We note that:

- The SWN concept is a relatively new one and it is too early to look for successes elsewhere. It typically takes a decade from network conception to profitable operation – making a comparison sooner than this may well lead to erroneous conclusions.
- Moving to an SWN is clearly part of a trend. Over time mobile operators have increasingly shared networks. Now in a four-mobile operator market there are often only two infrastructures, with pairs of mobile operators using the same masts, power, backhaul and more. In the UK and New Zealand there are also shared rural networks being deployed (which are SWNs for rural areas), and in some countries new operators are deploying shared neutral-host networks in urban areas which may become the single 5G network for small cells in areas of high population density.
- We have identified eight examples of SWN "implementations" Almost all of these are for 4G SWN's - where the case for multiple wholesale networks is much stronger than for 5G networks. In two cases (Mexico and South Africa) the implementations were not in fact SWNs but 4G networks where alternative commercial 4G was possible, and in one case (Brunei) the 4G SWN appears to have been successful.

In our view this evidence provides little support for the hypothesis that a 5G SWN will not work.

7 Our analysis of EMIR' claims on demand-side issues

EMIR seeks to characterise the 5G SWN as either unnecessary or unable to contribute to the Government's stated objectives and aspirations as detailed in its Digital Economy Blueprint.¹² It criticises the Government's priorities and DNB's plans, but its criticism appears misplaced and contradictory, as illustrated by its observations:

a) *5G is for an extremely high density of connected devices.*

EMIR is correct that 5G is well suited to serving a high density of connected devices. But this is only one element of its capabilities. It is now clear that the main driver of demand for 5G will be enhanced mobile broadband services and FWA services. DNB's 5G SWM rollout is therefore focused on meeting this demand by offering much higher broadband speeds and lower latency to urban and suburban end-users in Malaysia.

b) *5G will be extremely difficult to monetise even in densely populated areas.*

5G is not, as EMIR's comments suggest, a stand-alone investment which needs to be monetised. In our view the business case for rolling out 5G is that it provides a substantially lower cost way of meeting the growing demand for mobile data than 4G, as shown in Figure 1. This means that mobile operators can continue to grow their profits whilst offering mobile data services to end-users at lower prices.

c) *Malaysia is missing out on 4IR.*

While it is unclear what applications and services 4IR will involve, it is likely that many will need advanced connectivity of the form that only 5G can provide, using the massive machine connectivity (MMC) or ultra-reliable and low latency (URLLC) capabilities. Hence, deploying a 5G network is a prerequisite for enabling 4IR. DNB's SWN will ensure 5G is available more quickly than other options. This is one of the factors other governments have taken into consideration in their push for early adoption and roll out of 5G in what is described as '*the 5G race*' in the Economist's 5G Readiness Guide,¹³ a report cited and quoted from by EMIR.

¹² <https://www.epu.gov.my/sites/default/files/2021-03/Malaysia-Digital-Economy-Blueprint.pdf>

¹³ Economist Intelligence Unit, 2021, *The 5G Readiness Guide: Deployment strategies, opportunities and challenges across the globe*, <https://www.eiu.com/n/campaigns/5g-readiness-guide-report/>

This consideration may have been in the Malaysian Government's thinking when it chose the SWN option.

"The Government of Malaysia has decided to accelerate the deployment of 5G infrastructure network in Malaysia to realise the potential of 5G in creating new economic opportunities and innovation for Malaysia".¹⁴

d) A sluggish 5G demand which is undoubtedly expected

We believe that demand for 5G services in Malaysia is **uncertain** (as the big difference between the high and low demand projections of Malaysia's IWG show). But this is not the same as saying that demand for 5G Malaysia will certainly be "**sluggish**" it simply means that the supplier of 5G infrastructure in Malaysia, whether it is DNB as the SWN operator or individual/consortia of mobile operators, face demand-side risk when making their 5G infrastructure investment. What is much more certain is that without 5G, or with a high cost implementation of 5G infrastructure, future demand for mobile data in Malaysia is likely to be sluggish when compared with countries which were early adopters of 5G. This is illustrated in Figure 1 above.

8 Our analysis of EMIR's claims on governance

EMIR questions whether the governance structure for DNB will be sufficiently robust.

"DNB has a highly vulnerable governance structure. DNB is government-led, with a government-linked ecosystem and beneficiaries. There must be independent monitoring (financial, technical etc.) and oversight, given that project costs include sums (reportedly an estimated RM 1 billion) allocated for Malaysian Communications and Multimedia Commission (MCMC), the body regulating DNB"

EMIR also suggests that governance of DNB is similar to that of 1MDB.

We consider EMIR's claims about poor governance are misplaced, given that:

- DNB is a licensed telecommunications operator with a clearly articulated, detailed, and widely circulated business plan which has been scrutinised by the Government, by the mobile operators and by the Malaysian Communications and Multimedia Commission (MCMC).
- As a licensee, just like any other telecommunications operator in Malaysia, DNB will be subject to close scrutiny and extensive regulation by MCMC, an independent regulator established by the MCMC Act. MCMC will monitor DNB's progress against its plan and regulate the way it supplies wholesale 5G services to licensees in terms of both price and non-price supply conditions.
- The quality of DNB's operations will be subject to a minute by minute, transaction by transaction, scrutiny by the mobile operators each keen to ensure it secures the quality of service promised by DNB.
- DNB is an organisation which, within a few years, will be funded through a mix of private bondholders, the mobile operators and the government - with the government holding a modest minority interest. All of the stakeholders will have a keen interest in ensuring the financial health of their investments.
- The suggestion that DNB's governance is similar to that of 1MDB does not stand up to inspection. 1MDB was an investment company resourced with significant funds, empowered to raise even greater funds, and loosely tasked to invest in unspecified projects and initiatives. None of those characteristics are remotely similar to DNB's narrowly focused mission, which is under the constant gaze and review not

¹⁴ Minister of Communications and Multimedia Malaysia, 31/5/21, *Ministerial direction on the deployment of 5G infrastructure and network, Direction No 3 of 2021*

just of an independent regulator but more crucially, of its highly critical, expert and informed wholesale customers and soon to be investors.

EMIR also expresses concern that DNB's costs include regulatory fees of just over RM 1 billion. It is our understanding that this cost covers fees for 5G spectrum which are calculated using a publicly available schedule of charges for spectrum of various kinds.

9 EMIR's policy proposal to the Government and its impact on customers and citizens of Malaysia

In its article EMIR makes a policy proposal to the Governments review team:

- To repurposed DNB so that it rolls out passive infrastructure such as towers and fibre transmission links in rural Malaysia using Government funding.
- To abandon the DNB 5G SWN and reassign 5G spectrum to individual mobile operators so they can build individual 5G networks as and when demand dictates.

Any Government review will need to consider any policy options for change, against the counterfactual of the current situation and its likely outcomes.. In this case do EMIR's proposals deliver better outcomes to Malaysia when compared with current arrangements? In our view EMIR's policy proposal fails to do this for the reasons set out below.

Key aspects of the counterfactual are as follows:

- DNB has established itself, invested, purchased, built and successfully launched Malaysia's 5G network.
- DNB is ahead of schedule in meeting its mandate of 80% population coverage by the end of 2024.
- Five of the six main mobile operators have contracted to take DNB's wholesale service over the next 10 years.
- Four mobile operators have indicated their interest in taking an equity stake in DNB - securing its financial future and reducing the need for long term Government support.

Our analysis of EMIR's policy proposal is as follows:

- Because it involves the deployment of multiple new networks, EMIR's proposal would raises 5G costs by 4 to 5 fold when compared with the SWN. This would mean substantially higher end user prices > See Section 3.3 above.
- Significant costs have already been sunk by DNB in launching 5G services – costs which would be written off and then duplicated if the SWN model were abandoned.
- The proposal would introduce very substantial delays in 5G rollout as discussed in Section 3.6 above.
- There would be no significant improvement in service innovation or infrastructure competition as EMIR claims.

As a result, the mobile customers and citizens of Malaysia would be significantly worse off if EMIR's proposal were adopted. This would not be to the long-term benefit of end-users.

This analysis is clearly relevant to EMIR's policy proposal to any Government review team. But it is also relevant to other options which the review team may wish to consider.

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