

# insight

## Digital Connectivity

Ensuring Everyone Gets Connected: A Glance at Malaysia's Digital Connectivity Journey

*Strategy Paper*  
*March, 2023*



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# BEING CONNECTED IS EVERYTHING

COVID-19 has brought drastic changes to our lifestyles. It has transformed the way we live, the way we study, and the way we work. We become more reliant on digital connectivity to carry out our daily activities. This is especially true when Malaysia implemented the Movement Control Order (MCO) in March 2020.

The early days of MCO saw Internet traffic soaring up to 70%. Internet usage moved to residential areas and saw an increase of up to 70% when work-from-home and online distance learning arrangements kicked in. Gaps in network coverage and service quality became apparent, with the average Internet download speed reduced by nearly 40% and the number of complaints increased by up to 70%.<sup>1</sup>

**Internet traffic increased by 30% - 70%**



**Internet use have moved to residential areas by 50%-70%**



**Internet speed has reduced by 30%-40%**



**Complaints on internet speed, new coverage and indoor have increased from 40%-70%**



*Snapshot of connectivity issues during MCO*

*Source: National Digital Infrastructure Lab Report, 3 September 2020*

The wider public has no choice but to rely on the Internet as a part of necessity. Due to the surge of Internet reliance, the Government is compelled to accelerate the plan to improve the digital network; hence, the national digital infrastructure plan known as Pelan Jalinan Digital Negara (JENDELA) was developed. Following this, in June 2021, the Government of Malaysia approved the recognition of communications as a public utility, after water and electricity.<sup>2</sup>

The role of digital technology is clear, especially since the outbreak of the COVID-19 pandemic more than a year ago, which has resulted in tough, difficult challenges for all countries to continue their business as usual. It has never been clearer that technology is an essential tool for our daily lives. By 2025, Malaysia's digital economy is forecasted to contribute 22.6% to the GDP and the creation of half a million jobs by then. The nation's approach to the digital economy centres is focused on outcomes that benefit the Rakyat, businesses and the Government. Some of the indicators, among others, are to ensure a 30% uplift in productivity and vast adoption of e-commerce amongst medium and small micro-entrepreneurs (MSME).<sup>3</sup>

<sup>1</sup> JENDELA 2021 Summary Report

<sup>2</sup> ibid and <https://jkt.kpkt.gov.my/sites/default/files/2022-10/UKBS%201984%201C.pdf>

<sup>3</sup> Malaysia Digital Economy Blueprint

Malaysia has set itself up for success in the digital economy by establishing long-term national policies and national digital initiatives and programs. These national policies are formulas to ensure smooth digital adoption and a stronger digital economy. To achieve the identified digital efforts, all of Malaysia must be connected for these policies to be effective. Hence, JENDELA is a critical enabler of Malaysia's digital economy strategy, which aims for the last 3% Internet coverage in populated areas by 2025.<sup>4</sup>

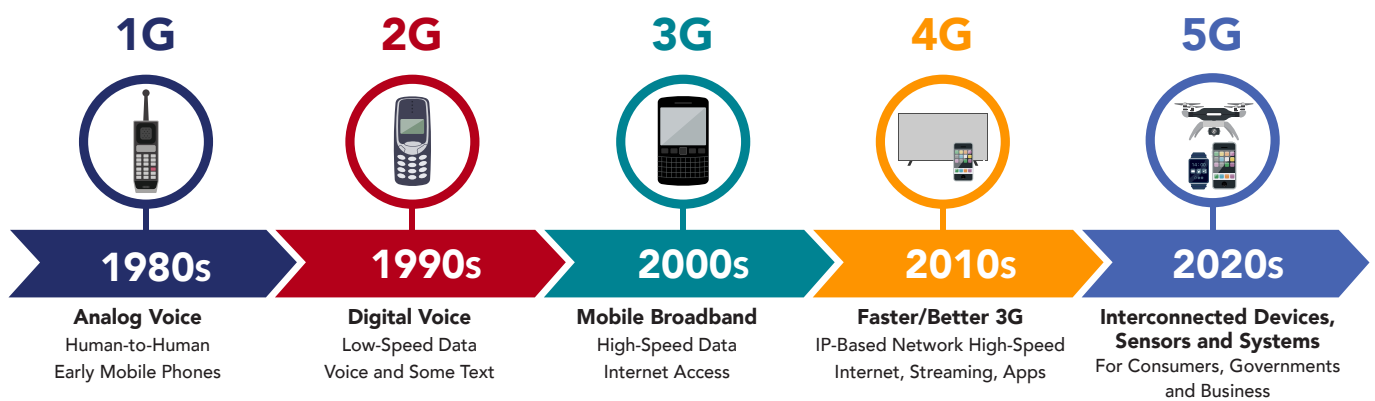
<p>27 September 2021</p> <p><b>Rancangan Malaysia Ke-12 (Twelfth Malaysia Plan)</b></p> 	<p>Launch Date: 18 Feb 2021</p> <p><b>Malaysia Digital Economy Blueprint</b></p> 	<p>Launch Date: 19 Jun 2021</p> <p><b>National Fourth Industrial Revolution (4IR) Policy</b></p> 
<p>As a policy enabler, the Twelfth Malaysia Plan will <b>accelerate Malaysia's adoption and application of digital and advanced technology to create and unlock new opportunities</b>. This will maximise the potential of the digital economy as well as achieve inclusive, responsible and sustainable socioeconomic growth for the Rakyat and businesses.</p> <p>Economic Planning Unit, Prime Minister's department</p>	<ul style="list-style-type: none"> <li>The Malaysia Digital Economy Blueprint is formulated as the action plan which outlines the strategic efforts and initiatives to ensure a <b>competitive and robust digital economy</b>. It envisions <b>Malaysia becoming the regional lead in digital economy</b> and to achieve inclusive, responsible and sustainable socioeconomic development in line with 12MP.</li> </ul> <p>Strategic Change Management Office (SCMO), EPU</p>	<ul style="list-style-type: none"> <li>The National 4IR Policy is a broad, overarching national policy that <b>drives coherence in transforming the socioeconomic development of the country</b> through ethical use of 4IR technologies. It supports national development policies such as the Twelfth Malaysia Plan (RMKe-12), Wawasan Kemakmuran Bersama 2030 (WKB 2030), and MyDigital Blueprint</li> </ul> <p>Ministry of Science, Technology, and Innovation</p>
<p>Launch Date: 8 Dec 2020</p> <p><b>The 10-10 Malaysian Science, Technology, Innovation and Economic</b></p> 	<p>Launch Date: 22 Nov 2019</p> <p><b>National Entrepreneurship Policy (NEP) 2030</b></p> 	<p>Launch Date: 31 Dec 2020</p> <p><b>Licensing Framework For Digital Banks</b></p> 
<ul style="list-style-type: none"> <li>A framework that is an integration of <b>10 key Malaysian socio-economic drivers with 10 global leading science and technology drivers</b> aligned to Malaysia's strengths and needs. The framework provides a systematic approach to transform Malaysia into a knowledge-intensive economy and shift Malaysia up the global innovation value chain.</li> </ul> <p>Akademi Sains Malaysia, MOSTI</p>	<ul style="list-style-type: none"> <li>The National Entrepreneurship Policy (NEP) is a <b>long-term strategy for Malaysia to become an outstanding entrepreneurial nation</b> by 2030.</li> <li>This policy prepares entrepreneurs to be equipped with 21st century skills, <b>digitalisation of business operations</b>, and collaborate with other entrepreneurs in order to <b>thrive in the digital environment</b></li> </ul> <p>Ministry of Entrepreneur Development and Cooperatives</p>	<ul style="list-style-type: none"> <li>A framework for digital banks developed by Bank Negara Malaysia (BNM) to offer banking products and services to <b>underserved or unserved market through digital or electronic means</b>. Licensing of new players with innovative business models is expected to add dynamism to the banking landscape to serve the economy and Rakyat.</li> </ul> <p>Bank Negara Malaysia</p>

*Digital connectivity in supporting related national policies*

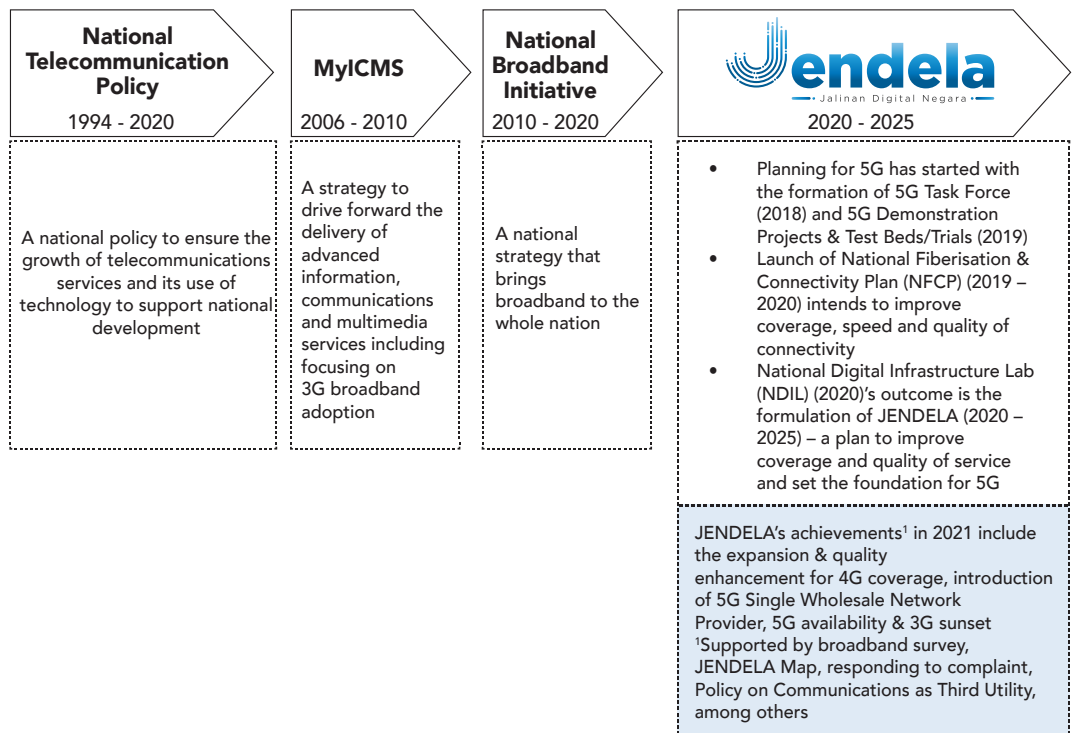
<sup>4</sup> Mentioned by YB Minister Communications and Digital in 1st Meeting of the 2nd Session of Fifteenth Parliament (2023)

# THE JOURNEY TO CONNECTIVITY

The Malaysian Communications and Multimedia Commission (MCMC), over the last 25 years since its establishment, has facilitated the regulation of mobile cellular service provisioning including 3G, 4G and 5G, in line with international standards.<sup>5</sup>



## 1998 - Convergence Framework via the enactment of Communications and Multimedia Act 1998



<sup>5</sup> International Mobile Telecommunications (IMT) standards, as set out by the International Telecommunications Union (ITU).

The International Telecommunications Union (ITU) anticipated that the number of connected devices on the Internet is projected to reach 50 billion from 2025 onwards. Increases in traffic and growth in the number of services, as well as demand for enhanced affordability and user experience, will all require innovative solutions.<sup>6</sup> The Fifth Generation of mobile technologies (5G) has the capability to connect people, things, data, applications, transport systems and cities in smart networked communications environments.

*Mobile phone calls and Internet access on the go are made possible by the invisible electromagnetic waves that any communications devices such as mobile phones and Wi-Fi transmit and receive. This electromagnetic wave, or spectrum, is a finite and highly valuable resource as it can be used in many services such as radio, television, mobile radio, air traffic control, security and others. When a particular bandwidth of spectrum is used by a particular service, use of the same bandwidth of spectrum by other service is subject to feasible sharing criteria to ensure coexistence and mitigate potential interference. MCMC plays a critical role in the management of spectrum which includes planning, coordinating, assigning rights or licence and monitoring of spectrum usage to ensure optimal and efficient utilisation of spectrum and delivering uninterrupted services to the users.*

*The use of the spectrum can only be allowed when the authorisation is issued by way of either Spectrum Assignment, Apparatus Assignment or Class Assignment under the Communications and Multimedia Act 1998 (CMA 1998). Consistent with the national policy objectives for the communications and multimedia industry as outlined in the CMA 1998, spectrum management is one of MCMC's priorities to facilitate efficient allocation of spectrum being the national asset and this is reflected through the publication of the Spectrum Plan, Standard Radio System Plan, Notice of Class Assignment, guidelines, notices, periodical public consultations exercise etc.*



Walkie-talkie

Did you know that these devices transmit and receive frequencies? Did you also know that MCMC issues Class Assignment for these devices?



Remote Control



Bluetooth devices



Radio frequency Identification Device



Wi-Fi

Source: ITU; LESICS (Learn Engineering through Physics); MCMC Spectrum Plan 2022

<sup>6</sup> <https://www.itu.int/en/mediacentre/backgrounders/Pages/5G-fifth-generation-of-mobile-technologies.aspx>

## JENDELA: Setting the Direction for the Future

JENDELA is a collaborative plan between industries and the Government, conceptualised through National Digital Infrastructure Lab (NDIL) which was conducted in 2020. It is a 5-year plan (2020-2025) and captured as a national digital communications enhancement initiative under the 12th Malaysia Plan (2021-2025).<sup>7</sup> It is formulated to provide wider coverage and better quality of broadband experience, to enable Malaysians to have access to quality digital connectivity. The Government estimates the investment of JENDELA Phase 1 to be RM28 billion of which 40% comes from MCMC's Universal Service Provision (USP) Fund while the remaining 60% is to be funded by industry players.<sup>8</sup>

*JENDELA was the result of a month-long deliberation at the National Digital Infrastructure Lab (NDIL) in 2020 to build a complete map of the country's communications infrastructure; a plan to improve broadband coverage and quality; and methods to optimise resources such as spectrum and fibre optics for enhancing digital connectivity. This strategy is based on a synergy of collaboration between the Government and industry players to create a successful 'quick fix' procedure.*

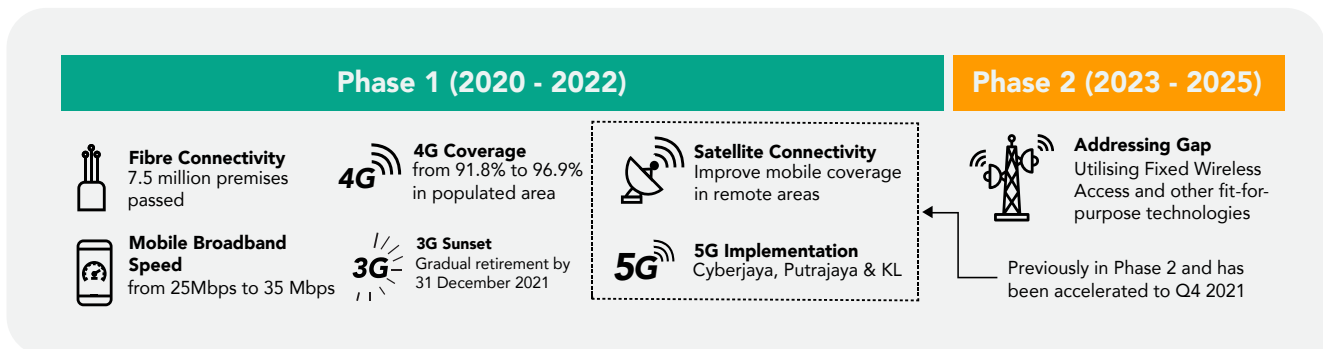
*There were more than 250 NDIL participants from Industry and Government/ Ministries/ Agencies at the Federal and State level in planning, approval, funding and providing digital infrastructure which include:*

- KKD
- MOF
- KPKT
- MOE
- MOHE
- KKR
- MOT
- KPLB
- MOSTI
- MITI
- KASA
- KETSA
- KWP
- EPU
- ICU
- MAMPU
- SMA

*The activities include breakout discussions and CEO Challenge Sessions to get buy-in (to convince the aspirations to improve connectivity, etc.)*

*Inception of JENDELA (Source: MCMC Annual Report 2020)*

JENDELA was launched in August 2020 and is carried out in two phases:



*JENDELA Journey (Source: MCMC JENDELA Summary Report 2021)*

<sup>7</sup> [https://myjendela.my/en-GB/FAQ-and-Glossary/FAQs-\(1\)/FAQ](https://myjendela.my/en-GB/FAQ-and-Glossary/FAQs-(1)/FAQ)

<sup>8</sup> <https://www.bernama.com/en/business/news.php?id=2121650>

**Phase 1 (2020-2022)** involves optimising existing resources and infrastructure for both mobile and fixed connectivity by:

- Expanding 4G mobile broadband coverage from 91.8% to 96.9% in populated areas;
- Increasing mobile broadband speeds from 25 Mbps to 35 Mbps; and
- Enabling as many as 7.5 million premises to access gigabit speeds with fixed broadband services.

This involves the gradual switch-off/sunset of 3G networks until the end of 2021, allowing further upgrades to 4G networks and strengthening the foundation for 5G networks. Successful JENDELA Phase 1 rollout will pave the way for Malaysia's transition to plan and rollout of 5G as well as the deployment of satellite connectivity.

With the Government's decision to accelerate 5G implementation from Phase 2 implementation in 2023 to Q4 2021 (Phase 1), the country will be better equipped to transition to fifth-generation cellular network technology efficiently.

**Phase 2 (2023-2025)** involves addressing the remainder of the digital divide not covered under Phase 1, utilising satellite connectivity and other fit-for-purpose technologies. Sparsely populated and remote areas will have access to the Internet and those in rural areas are expected to enjoy Internet access by 2025.<sup>9</sup>

*JENDELA has benefited the Rakyat in various ways. From providing ease to necessities to ensuring the country's economic growth, JENDELA has helped everyone in adapting to the changing digital lifestyle. Let's watch Mei Li and Muthu's stories :*

Apa itu JENDELA: <https://youtu.be/d1V-Ez7fmF0>

Benefit of JENDELA (Kliping JENDELA - Muthu Warga Emas) :  
<https://youtu.be/SUohGlmsYec>

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<sup>9</sup> <https://www.mcmc.gov.my/en/media/press-clippings/more-rural-areas-to-enjoy-Internet-access-once-jen>



## JENDELA Achievements as of Q4 2022

Malaysians today have access to an average mobile broadband speed of 116.03 Mbps higher than the goal set target by end of 2022 which is 35 Mbps. There has also been a rise in 4G population coverage of 96.92% compared to 91.8% during the early commencement of JENDELA Phase 1. A total of 7.74 million premises now have access to fibre connectivity.

MCMC recorded 64,020 network-related complaints in the period of January to December 2022. Overall network complaints in 2022 have shown a positive reduction compared to the network complaints in 2021, which amounts to 200,675 complaints. Most complaints were related to 4G coverage and quality of service. MCMC and the Service Providers are working towards reducing complaints by enhancing 4G quality, monitoring traffic utilisation, and educating consumers. With the completion of 1,661 new 4G towers, it is expected that complaints in rural areas will be addressed.

Noting that the issue on quality of 4G services remain a concern from the consumers, routine audits are conducted to monitor the level of performance of the quality of services provided by Service Providers. The audit and verification exercise is to ensure the compliance of Service Providers to the Mandatory Standard of Quality of Service (MS QoS). The audit measures the actual levels of mobile broadband speed and compare with reports prepared by the Service Providers. In 2022, MCMC had conducted technical audits on broadband services under the MS QoS in 3,080 locations nationwide that were selected based on the location records of complaints received by MCMC. The Commission Directions were issued to Service Providers who failed to comply with the MS QoS in 214 unique locations.<sup>10</sup>

Digital Nasional Berhad (DNB) has the goal of reaching 80% coverage by the end of 2023.<sup>11</sup> To ensure participation from all industry players, the current Government has taken a transparent and inclusive approach to managing DNB. The ultimate goal is to provide the rakyat with comprehensive 5G coverage that is both accessible and affordable. This shift toward more collaborative management of digital infrastructure reflects a growing recognition of the importance of digital connectivity in shaping the country's economic and social future.<sup>12</sup>

The implementation aims to improve communications services for companies and factories, leading to better productivity and services for the public. 5G offers benefits such as better traffic management, real-time city monitoring, and added benefits to factories and Industry Revolution 4.0. The Ministry of Communications and Digital (KKD) aim is to create a digital-friendly nation with a successful and efficient implementation of 5G technology.<sup>13</sup>

The 5G network has been rolled out since quarter four (Q4) of 2021 with a goal of reaching 37.9% population coverage by the end of 2022. So far, the 5G network rollout in populated areas has exceeded the target by achieving 54.7%, with 4,363 sites throughout the country since the commencement of 5G in Q4 2021. The Government is continuously working towards ensuring that the citizens have access to fast and efficient 5G network coverage.

<sup>10</sup> Following this and as of 13 February 2023, relevant Service Providers have improved their QoS (172 Directions), a verification will be made for 13 Directions and for the remaining Directions, civil action will be taken for failure to comply to the instrument.

<sup>11</sup> National Budget 2023 Speech

<sup>12</sup> Ibid

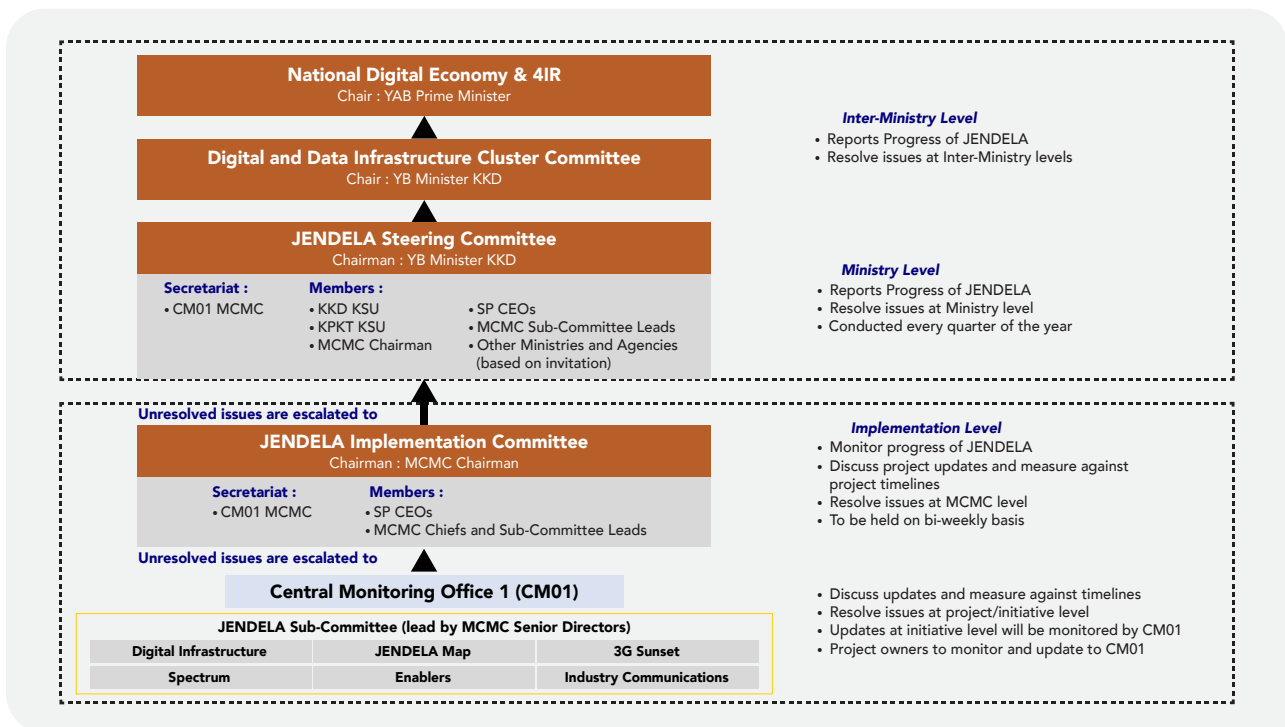
<sup>13</sup> <https://www.bernama.com/en/news.php?id=2158747>

## Collaboration and Cooperation with Government Agencies and Service Providers

The JENDELA governance structure, guided by the values of transparency and accountability, is an important factor in ensuring the smooth implementation of the JENDELA action plan. The structure consists of:

- JENDELA Steering Committee, chaired by YB Minister Communications and Digital, to resolve inter-ministries/agencies issues, where YB Minister Communications and Digital provides facilitation at the Ministry level. Additional escalation will be directed to the National Digital Economy and 4IR Council, which is chaired by the Prime Minister;
- JENDELA Implementation Committee, chaired by MCMC Chairman, to monitor Key Performance Indicators (KPIs), project updates and timelines, and resolve issues at MCMC level; and
- Six sub-committees led by MCMC's Senior Directors to discuss updates and resolve issues at the project level.<sup>14</sup>

MCMC has established the Central Monitoring Office 1 (CMO1) under the Central Monitoring Division (CMD) to monitor project implementation within the key areas. Through close collaboration with respective State authorities and Service Providers, MCMC can identify issues, resolve conflicts, propose intervention measures, and provide directions on pushing forward plans.



JENDELA Governance Structure

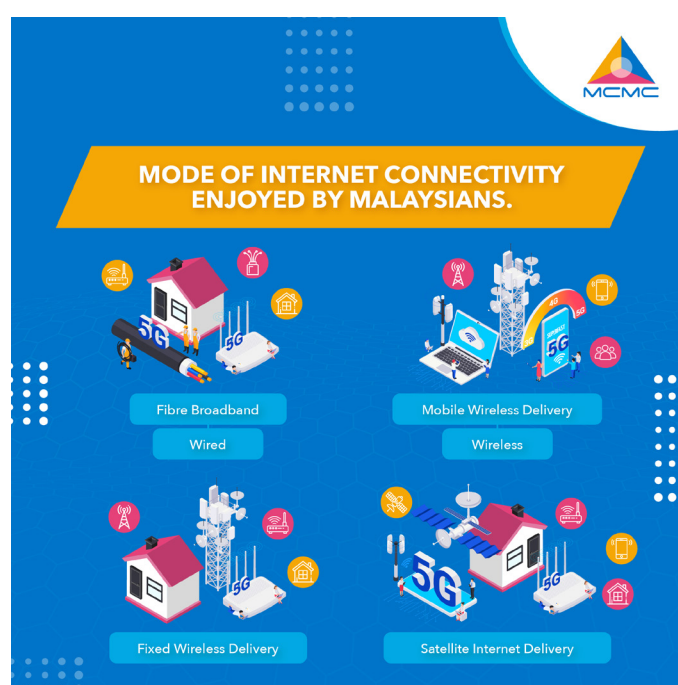
Source: [https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-MyConvergence\\_20.pdf](https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-MyConvergence_20.pdf)

<sup>14</sup> [https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-MyConvergence\\_20.pdf](https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-MyConvergence_20.pdf)

# DIGITAL CONNECTIVITY IN MALAYSIA

## Finding the Right Fit

Internet in Malaysia is delivered through wired<sup>15</sup> (fibre/copper) and wireless broadband. Users subscribe to, for instance, Unifi and TIME for fibre connectivity; and CelcomDigi, Maxis and U Mobile for mobile connectivity.



*Mode of Internet connectivity enjoyed by Malaysians. (Source: MCMC)*

The global statistics of smartphone adoption and Internet usage continues to grow exponentially as digital offerings become crucial to everyday life.<sup>16</sup> Anticipating this global trend and addressing the potential network congestion due to the high demand of data consumption, as well as other factors, Service Providers are looking into potential solutions including upgrading cell sites as well as looking into underlying new infrastructure and improving backhaul via fiberisation.

Fibre optics broadband serves as an efficient solution for stable and fast connectivity, even so, it is not without its limitation. Fibre optics deployment is a capital-intensive process. It requires higher investment for fibre optics deployment, is time-consuming as construction is necessary, and often with excavation and transportation of resources, including site visits to customer premises.<sup>17</sup>

<sup>15</sup> 88.38% for fibre and 11.62% for copper (Source: MCMC)

<sup>16</sup> GSMA Mobile Economy 2021

<sup>17</sup> Ericsson FWA Handbook 2020

To get the best of both fibre and mobile connectivity, Fixed Wireless Access (FWA) is used to complement both technologies' challenges. In many circumstances, users themselves may install FWA provided by Service Providers, making it more convenient. Fixed Wireless Access (FWA) refers to methods of providing wireless Internet access to homes or businesses without laying down fibre and cables to provide wireless Internet access to the premise. From the household perspective, FWA resembles fixed broadband. FWA deployments enable faster rollout over fibre deployments, giving the same experience as fibre connectivity satisfaction, and a low-risk financial profile. FWA installations are more environmentally friendly and sustainable than fibre because much of the infrastructure is reused.

#### Fixed Wireless Access

Source: MyJENDELA.my; ITU; Ericsson Fixed Wireless Access Handbook 2020

Noting the challenges in deploying digital infrastructure and connectivity in areas with less population, which are usually considered as not commercially viable by Service Providers, MCMC shall ensure through the JENDELA programs, that those in the remote areas would at the very least, have access to the Internet, while those in the rural areas were expected to enjoy 4G mobile networks and Internet access by 2025.<sup>18</sup> As such, under JENDELA Phase 2, the target is to achieve the last 3% Internet coverage in populated areas, to ensure all Malaysians have access to Internet connectivity by end of 2025.<sup>19</sup>

### True North

### 2023 - 2025

Considerations to achieve 2025 True North



**100% Internet Coverage**

- Sites to be covered with High Throughput Satellite
- Complementary services of WiFi to be considered
- Optimisation and selection of fit for purpose solutions (Pole (Hybrid), Satellite, Towers, etc.) based on area



**9 Mil Premises passed with gigabit Access**

- 1.5 mil new premises to be passed through fiber connectivity and complementary Fixed Wireless Access (FWA)



**100 Mbps Mobile Broadband Speed**

- Towers to support 4 Service Providers (SPs) (MOCN or MORAN) to minimise (or zero) areas covered by single providers
- Minimum speed of 35Mbps to be deployed
- Towers to be fiberised and optimised for enhanced speed
- 5G deployment will aid speed in the future





JENDELA Lab 2.0 True North (Source: MCMC JENDELA Lab 2)

<sup>18</sup> <https://www.mcmc.gov.my/en/media/press-clippings/more-rural-areas-to-enjoy-Internet-access-once-jen>

<sup>19</sup> Mentioned by YB Minister Communications and Digital in 1st Meeting of the 2nd Session of Fifteenth Parliament (2023)

JENDELA will prioritise populated areas and areas having economic activities. For the purpose of measuring coverage in populated areas, MCMC and the industry players have agreed to use at least 20 people per square kilometre as the indicator.

Population coverage and geographical coverage (Source: NDIL Report 2020)

Technology Solutions	Technology Description	Population (density)			
		Urban ≥ 200 / sq. km <sup>2</sup>	Sub-Urban 66 - 199 / sq. km <sup>2</sup>	Rural 20 - 65 / sq. km <sup>2</sup>	Remote ≤ 19 / sq. km <sup>2</sup>
1	 <b>Mobile Broadband</b> <ul style="list-style-type: none"> <li>• Mass, personalised and on-the-go usage</li> <li>• Wide geographic coverage</li> </ul>	✓	✓	✓	
2	 <b>Fixed (wired) Broadband</b> <ul style="list-style-type: none"> <li>• Premise-based</li> <li>• Heavy and unlimited usage</li> </ul>	✓	✓	✓	
3	 <b>Fixed Wireless Access</b> <ul style="list-style-type: none"> <li>• Alternative for fixed (wired) broadband</li> <li>• Sparsely populated areas</li> </ul>	✓	✓	✓	
4	 <b>Satellite Broadband</b> <ul style="list-style-type: none"> <li>• Geographically challenging areas</li> <li>• Provide basic voice and Internet access (e.g WhatsApp, Facebook, etc)</li> </ul>				✓

Potential fit-for-purpose solutions for different areas in Malaysia (Source: MCMC JENDELA Lab 2)

The key constraints to rural connectivity are driven by both technological and economic concerns. Nevertheless, in today's modern era, there are many new technology solutions available which can address the digital gap. Internet connectivity can be improved by selecting efficient, cost-effective, and fast deployment technologies – whether wired or wireless. There is no one solution that fits all. Choosing the right technology is a challenge, but vital, because we want rural communities to stay connected, just like people living in areas where connectivity is always available.

In exploring the efforts in connecting all Malaysians, several potential technologies to bridge the gaps in digital connectivity are being considered and discussed in JENDELA Lab 2.0, held in May 2022. The lab participants deliberated the pros and cons of possible solutions from the technological, economical, and funding perspectives to ensure a viable and faster solution is deployed for the remaining uncovered areas.

Additionally, several initial efforts are being explored, including providing collective Wi-Fi Internet access and digital connectivity in rural and remote areas using Wi-Fi technology and high-throughput satellite access to achieve the remaining 3% Internet connectivity by 2025. In ensuring connectivity in areas such as popular tourist destinations, network-sharing through multi-operator core networks (MOCN) or domestic-roaming will be explored to ensure quality mobile broadband services.

## The Promise of High-Speed Internet

Service Providers are currently collaborating with local Governments through MCMC to fiberise premises. While it is a common perception that high-speed broadband is only available through fibre connectivity, the Government has been looking into ways to improve mobile speed experiences. One of the paths being explored is achieving 100 Mbps broadband speed, which will be primarily supported by the 5G network.

The deployment of 5G in Malaysia began in December 2021 after the Government fast-tracked the plans to deploy 5G in JENDELA Phase-2 from 2023 to Q4 2021. The overall target for Malaysia's 5G deployment plan is to complete the deployment of 10,167 5G sites by 2029 nationwide. The targets for 2023 include deploying over 7,500 5G sites and achieving a populated coverage of 80%. Currently, a total of 5 mobile network operators (MNOs) offer commercial 5G services, and it is expected that subscriptions to 5G-ready mobile packages will only increase.

5G connects people, things, data, applications, transport systems and cities in smart networked communications environments. It can transport a huge amount of data much faster, reliably connect an extremely large number of devices and process very high volumes of data with minimal delay.<sup>20</sup> Consumer's demand grows alongside the evolution of mobile network technologies. As we enter the 5G era, consumers expect a seamless connectivity experience. Users want to be able to stay connected at all times, expecting connectivity to remain superior indoors, and outdoors and when they are on the move. In addition to the consumer mobile market, 5G heavily benefits enterprise use cases due to its ultra-reliable, ultra-low latency, and high-speed connectivity. It is these features of 5G that will facilitate the digital transformation of different industries including transportation, healthcare and manufacturing.

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<sup>20</sup> <https://www.itu.int/en/mediacentre/backgrounders/Pages/5G-fifth-generation-of-mobile-technologies.aspx>

## Fixed Mobile Convergence

Fixed Mobile Convergence (FMC) is a term used to describe integrated connectivity between fixed and wireless communication networks. Service Providers use FMC to provide seamless switching between a wireless and local network for mobile users, hence offering a seamless indoor experience to mobile users within the building, through a combination of mobile and Wi-Fi. The goal of FMC is to optimise the way to share data, voice, video etc., using a combination of fixed broadband and local access wireless technologies like Wi-Fi, regardless of location or device.<sup>21</sup>



Example of a scenario where FMC applies. (Source: MCMC)

MCMC together with industry players will continue to formulate new approaches to ensure the provisioning of seamless connectivity throughout Malaysia with an acceptable quality of experience to be enjoyed by all Malaysians.

*The Fixed Mobile Convergence, coined in 2004 by the Fixed-Mobile Convergence Alliance (FMCA), is "a transition point in the telecommunications industry that will finally remove the distinctions between fixed and mobile networks, providing a superior experience to customers by creating seamless services using a combination of fixed broadband and local access wireless technologies to meet their needs in homes, offices, other buildings and on the go". In this definition 'fixed broadband' means a wired connection to the Internet, such as fibre to the home (FTTH), digital subscriber line (DSL), cable or T1 lines, while 'local access wireless' means Wi-Fi or any cellular radio technology (macro or small cells)<sup>22</sup>.*

<sup>21</sup> <https://www.factmr.com/report/fixed-mobile-convergence-market>

<sup>22</sup> [https://www.c114.com.cn/topic/images/5649/PDF/Technical%20Convergence\\_V16\\_FINAL\\_5march2019\\_Bis-FINAL.pdf](https://www.c114.com.cn/topic/images/5649/PDF/Technical%20Convergence_V16_FINAL_5march2019_Bis-FINAL.pdf)

Under FMC, cellular telephone services can coexist with the services of fixed networks. From a consumer perspective, the convergence of fixed and mobile can be viewed as potential new service offerings to be offered by the telcos. The biggest advantage of FMC is providing convenience to both consumers and business users.<sup>23</sup> Potential scenarios for FMC include: seamless voice calls experience with voice-over IP technology e.g. continuing conversations from fixed-line at-desk calls to elsewhere including outdoor locations without switching phones or numbers (no dropped calls), seamless services i.e. IoT-enabled devices, machine-to-machine communications, etc.<sup>24</sup>

#### Fixed Mobile Convergence

Source: <https://www.uctoday.com/unified-communications/fixed-mobile-convergence-the-basics/>

In 2021, the Wireless Broadband Alliance has published a “Blueprint for 5G and Wi-Fi 6 Convergence” among others, highlighting the benefits of seamless integration of Wi-Fi and cellular access in the 5G networks to businesses and operators, including the following:

Public & Enterprise Wi-Fi:	Increases deployment possibilities and scenarios for operators and access providers, allowing them to deliver a more seamless user experience and maintain better visibility and overall control of the networks.
Industry 4.0:	The potential use of both 5G NR <sup>25</sup> and Wi-Fi access dramatically improves connectivity and traffic steering on the factory floor across both accesses, facilitating the greater utility of artificial intelligence and machine learning.
Smart City:	5G NR and Wi-Fi access can interoperate to create uninterrupted connections, and traffic to data-hungry edge applications can be more easily managed.
At home:	The availability of both accesses allows a mix of traffic options in residential applications to boost connectivity and provide a more well-rounded end-user experience <sup>26</sup> leveraging on last-mile access such as FWA.
Wi-Fi only devices:	Convergence enables the availability and reach of 5G services and applications to more devices in many more locations with support for Wi-Fi only devices.

#### Benefits of Seamless Integration in 5G Networks

Source: <https://www.telecomtv.com/content/open-networking/are-we-on-the-brink-of-seamless-fixed-mobile-convergence-the-signs-are-good-40711/>

<sup>23</sup> <https://www.uctoday.com/unified-communications/fixed-mobile-convergence-the-basics/>

<sup>24</sup> <https://myJENDELA.my/en-GB/FAQ-and-Glossary/Technology-Solutions>

<sup>25</sup> 5G New Radio (5G NR) is a global standard for a unified, more capable 5G wireless air interface. It will deliver significantly faster and more responsive mobile broadband experiences, and extend mobile technology to connect and redefine a multitude of new industries (Source: <https://www.qualcomm.com/research/5g/5g-nr>)

<sup>26</sup> Similar fibre connectivity can be experienced through audit mile access such as FWA



## 5G, Wi-Fi 6 and 6E

Consumers and enterprises can look forward to the latest Wi-Fi and 5G technologies which promise to deliver higher performance, lower latency, massive connectivity and faster data rates to power next-gen devices like the Internet of Things (IoT). These technologies offer promising features essential to furthering business efficiency and enhancing users' digital experiences. They are different technologies that complement each other.

Smartphones, tablets, and PCs are some of the most popular Wi-Fi 6E-equipped devices, but the technology is also used in many others, including wireless cameras, smart home devices, game consoles, wearables, and AR/VR headsets.

Each technology answers specific business needs or conditions.<sup>27</sup> 5G operates on a cellular front, might be suitable for companies with large outdoor operations. Organisations with indoor operations or determined access points can take advantage of Wi-Fi 6E for their 6 GHz-enabled devices and equipment. Wi-Fi 6E enables greater network performance and supports more Wi-Fi users in dense and congested environments e.g., transportation hubs, sports arenas, and business complexes.



Various use cases for 5G and Wi-Fi 6 as complementary technologies

Source: <https://www.pxosys.com/wi-fi-6-and-5gperfect-storm-of-wireless-access/>

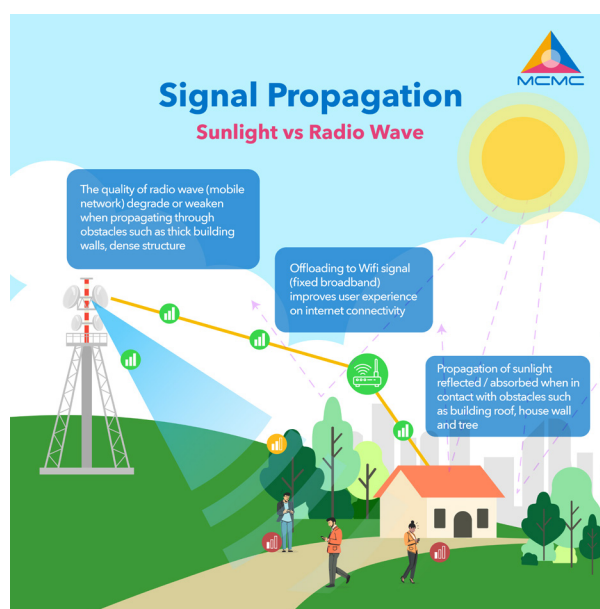
<sup>27</sup> <https://www.baselinemag.com/mobility/5g-wifi-6-future-of-wireless-connectivity/>

Realising the potential of this latest generation of Wi-Fi, MCMC issued a Public Consultation Paper on Wireless Local Area Networks (WLAN) in the 6GHz Frequency Band on 12 August 2021.<sup>28</sup> Following the Public Consultation exercise, MCMC has issued Class Assignment No. 1 of 2022 on 19 January 2022 to allow the use of the short range devices, including WLAN/Wi-Fi applications in the 5925 MHz to 6425 MHz frequency band subject to the technical conditions stipulated in the Class Assignment.<sup>29</sup>

In view of the increasing momentum and the international studies and discussion on other wireless broadband technology in the 6 GHz spectrum, MCMC will continue to monitor the global development and international studies of the 6425 MHz to 7125 MHz frequency band, including the outcome of the ITU World Radiocommunication Conference 2023 on this frequency band to ensure that any decisions regarding the use of this frequency band will allow Malaysia to attain the best use of the spectrum.

## Improving In-Building Coverage

In-building coverage is equally important as cellular coverage outside the building for ensuring the seamless operation of daily tasks. Poor in-building coverage is expected in enclosed areas because outdoor coverage cannot penetrate through obstacles such as thick building walls or dense structures such as underground parking spaces, high-rise building, tunnels, subways or lifts area. Other causes are low penetration due to building materials, and blockage from surrounding walls or buildings. To extend and improve the cellular mobile coverage indoors, it is required to implement full in-building coverage.



Signal Propagation Diagram (Sunlight vs Radio wave) (Source: MCMC)

Proper planning at the initial stage between building owners and Service Providers is vital to ensure a well-established in-building coverage. *Garis Panduan Perancangan Infrastruktur Komunikasi* (GPP-I) and Radiocommunications Network Facilities In-Building help developers and building owners to plan in-building coverage at the preliminary stage, with standardise designs and established industry practice.

<sup>28</sup> This exercise intends to investigate the potential use of the 6GHz frequency band in Malaysia for Wi-Fi devices under the Class Assignment

<sup>29</sup> The latest Class Assignment document can be found in this URL:  
<http://www.mcmc.gov.my/en/spectrum/assignment-of-spectrum/class-assignment>.

## Next Generation Wireless

Globally, for the next generation of wireless, Wi-Fi 7 is currently in the standards development stage, and it is aimed to maximise overall capacity, decrease latency, and increase speed to every device.

*Wi-Fi 6 provides higher performance, lower latency, and faster data rates, complementing the deployment of 5G networks by ensuring connectivity indoors, in public venues and smart buildings, and in underserved areas, where 5G is far less effective. With features like Orthogonal Frequency Division Multiple Access (OFDMA), Wi-Fi 6 can better serve the diverse needs of IoT devices.*

*Wi-Fi 6E then extends these great benefits into the 6 GHz band, which offers significant increases in available bandwidth. Wi-Fi 6E takes full advantage of the increased bandwidth, less congested spectrum, and multiple super-wide channels in 6 GHz to deliver innovations like Augmented Reality/Virtual Reality, 8K streaming, and more.*

*Wi-Fi 6E also includes power improvements, such as Target Wake Time (TWT), which are well suited for highly congested IoT networks where many different battery-powered devices and sensors are connected to the network. This feature brings huge improvements in efficiency and battery life.*

*Potential of Wi-Fi 6 and Wi-Fi 6E for various use cases with diverse connectivity demand*

*Source: <https://www.wi-fi.org/beacon/kevin-robinson/wi-fi-6-and-wi-fi-6e-the-key-to-iot>*

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## Addressing Challenges in Infrastructure Deployment

As the Government has announced that communications services are recognised as a third utility, a few initiatives have been undertaken to streamline policies on infrastructure planning and facilitating infrastructure rollout: among others through the development of the guideline, namely *Garis Panduan Perancangan Infrastruktur Komunikasi (GPP-I)*.<sup>30</sup> The guideline serves to include the requirement for all new development to plan for communications reserve. Through this guideline, it is anticipated that no new development area is left without digital connectivity.

With the proliferation of 5G and improving quality of experience, the 5G technology provides services at short-range distances and requires massive installation of 5G infrastructure. Designs of small cell infrastructure are to be modelled as part of street furniture and integrated with urban design elements. Several methods to minimise the visual impact of small cell infrastructure are full concealment, camouflage, custom structures design, colour code adapted to the building design or colour, or any other appropriate method. This is to preserve the planning aspects of the gazetted area, the environment of heritage sites and building facades.

In view of the above, MCMC with other stakeholders has also drafted a guideline and technical code for minor communications, and infrastructure which also accommodate the requirements for aesthetic installation.<sup>31</sup> The guideline, among others, intends to facilitate Local Authorities in developing a simplified process specifically for the minor communications infrastructure category. The guideline also aims to prepare for infrastructure readiness on new technology. This will be incorporated in the revised GPP-I as a reference guideline by the relevant stakeholders, and to be adopted nationwide and implemented.



*Samples of Street Furniture Structure - The design of small cell infrastructure should be modelled as part of street furniture due to limited space in the high-density area and give a lower visual impact*

*Source: 5G Task Force Report 2019*

<sup>30</sup> This has been approved by Majlis Perancang Fizikal Negara (MPFN) and Majlis Negara bagi Kerajaan Tempatan (MNKT) respectively and has been adopted by all states in peninsular Malaysia.

<sup>31</sup> The requirements for aesthetic installation, wherever relevant, shall comply with the specification listed in Technical Standards and Infrastructure Requirements - Radio communications Network Infrastructure (External) (MTSFB 001:2009).

# **SAFEGUARDING CONSUMERS' INTEREST – IMPROVING ACCESSIBILITY, AFFORDABILITY AND SKILLS**

Consumer protection has always been a priority of MCMC. MCMC is committed to safeguarding the interests of users of communications services and facilities and promoting consumer confidence and satisfaction with the quality of service.

Communications infrastructure is now recognised as the third essential utility after water and electricity. Broadband accessibility is also about being able to afford the services. It is important that its pricing is structured to accommodate the budget of most Malaysians, especially those in the low-income bracket.

MCMC will continue to engage and educate consumers on the right use of devices and empower them to demand better services as promised by Service Providers. It is also imperative that Malaysians have adequate digital skills and literacy to fully utilise the digital facilities available to them.

## **Empowering Consumers**

MCMC strikes a careful balance between the consumer's, industries, and investors' interests. MCMC also assures that Malaysians have access to competitive pricing, a wide range of options, high-quality service, and appropriate broadcast material. Following Sections 195 and 196 of the CMA 1998, MCMC ensures that consumers have a choice and a satisfactory level of service at an affordable price, that consumers benefit from the provision of necessary services, that complaints are handled fairly and effectively, and that the level of complaints received from consumers is monitored.

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## Certification of Communications Devices and Check Your Label Programme

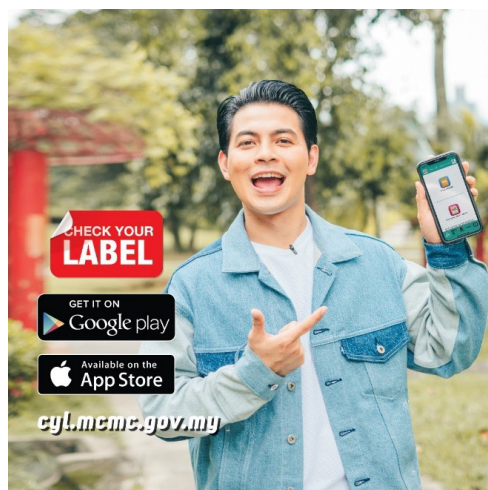
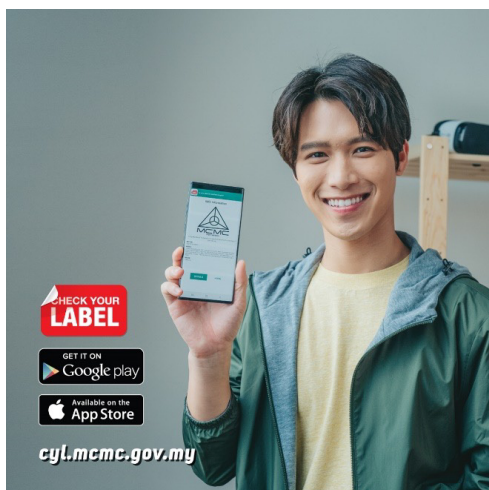
All communications devices for sale in Malaysia must be certified in accordance with Communications and Multimedia (Technical Standards) Regulations 2000 (TSR 2000) under CMA 1998. The certification is to ensure that the communications device complies with the followings:

- i. comply with the required technical codes or standards;
- ii. ensure interoperability between any communications device;
- iii. do not cause frequency interference with, impairment, or malfunction of, or harm to any communications device or any other equipment; and
- iv. do not compromise the safety of the general public, any communications device or any other equipment.

SIRIM QAS International Sdn. Bhd. (SQASI) has been appointed to carry out the certification activities for communications device. SQASI is the registered certifying agency under the CMA 1998 and TSR 2000 since 3 September 2003.

MCMC has launched the Check Your Label (CYL) awareness campaign to educate the public about the importance of purchasing communications device that bears the MCMC label and provide guidance to the consumer and industry on the requirements of MCMC label. The MCMC label is the indicator that the device has been certified according to the standards that have been set. The public is also encouraged to verify the validity of MCMC label found on the communications device by using the CYL mobile application which can be downloaded from Google Play and App Store.

The objective of CYL is to educate the public on the importance of MCMC label for communications devices. Users are encouraged to check the MCMC label prior to purchasing any communications device and to only purchase communications devices with MCMC label.



*Check Your Label is a campaign to create awareness among consumers on the importance of purchasing communications devices with a valid MCMC label*

## Electromagnetic Field and RF-EMF Standards in Malaysia

Given the high number of mobile phone users in Malaysia, any potential public health impact must be investigated, understood, and monitored.<sup>32</sup>

All radio communications systems use the radiofrequency (RF) spectrum which is part of the electromagnetic field (EMF) in the range between 3 kilohertz (kHz) and 300 gigahertz (GHz). These include TV, AM and FM radio broadcasting, mobile phones and their base stations, paging services, cordless phones, baby monitors and emergency and rural communications systems. Mobile phones communicate by transmitting radio waves through a base station network of fixed antennas.

EMF consists of waves of electric and magnetic energy moving together through space, and the term is used to indicate the presence of electromagnetic radiation. It can be found everywhere in our everyday lives from natural and man-made sources with the earth, the sun and the ionosphere being the all-natural sources of the EMF.<sup>33</sup>

RF-EMF is categorised as non-ionised radiation. Exposure to the RF-EMF at high levels and within the safe limits can only cause thermal effect or heating of tissue that leads to an increase in the body temperature. It does not have sufficient energy to cause long-term damage to body tissue.

In line with the implementation of the JENDELA initiative toward preparing the country's digital infrastructure for 5G network deployment, MCMC has emphasised the safety aspects of this new mobile generation technology in relation to RF-EMF.

MCMC regulation on the RF-EMF emissions from mobile phone base stations and other communications installations is determined in the mandatory standard, Commission Determination on the Mandatory Standard for Electromagnetic Field Emission from Radiocommunications Infrastructure (MS EMF). The MS EMF applies to Network Facilities Providers (NFP) and Network Service Providers (NSP) operating the radiocommunications infrastructures such as the base station transmitters including 5G. The MS EMF also takes into consideration of the new EMF exposure limits to be in line with the International Commission on Non-Ionising Radiation Protection (ICNIRP) guideline published in 2020.

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<sup>32</sup> <https://www.who.int/news-room/fact-sheets/detail/electromagnetic-fields-and-public-health-mobile-phones>

<sup>33</sup> <http://rfemf.mcmc.gov.my/>

## Affordability - Universal Access to Everyone

MCMC is focused on addressing the digital divide and improving access to all layers of society. It is important that everyone has access to the connectivity they need. It is crucial to the economic growth of Malaysia.

The Government has been working closely with Service Providers to ensure that the Rakyat can afford Internet connectivity. The *Jaringan Prihatin* programme, announced in the 2021 Budget, is the result of this close collaboration. The programme is designed to help about 8 million people to own mobile devices and subscribe to mobile broadband plans.<sup>34</sup>

Service Providers, on their initiatives too, have banded together to introduce affordable broadband packages to their customers: the *Pakej Peranti* and *Pakej Remaja* for youths and students in the B40 group. This initiative helps Malaysian including B40 groups, youth, and students to have an affordable package to communicate, study and increase productivity. Several service providers have collaborated to make this initiative a success from October 2021 to October 2022.

The YB Minister of Communications and Digital has recently announced two new initiatives - *Pakej Perpaduan* and *Pakej Perpaduan Jalur Lebar Tetap* - which aim to enhance internet access affordability and reduce the cost of living for individuals in the lower-income bracket.<sup>35</sup> The *Pakej Perpaduan*, priced at RM30, offers a data quota of 30GB and mobile internet speeds ranging from 1Mbps to 3Mbps for a duration of 180 days, equivalent to six months. On the other hand, the *Pakej Perpaduan Jalur Lebar Tetap* offers unlimited data with speeds of up to 30Mbps for a monthly subscription fee of RM69, with a 24-month contract. These packages are specifically tailored to benefit the B40 economic group, as well as youths aged between 12 and 30, persons with disabilities (PWD), senior citizens, and army and police veterans.

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<sup>34</sup> <https://belanjawan2021.treasury.gov.my/pdf/speech/2021/bs21.pdf>

<sup>35</sup> <https://www.kkd.gov.my/en/118-berita-terkini/23489-pakej-perpaduan-jalur-lebar-rapatkan-jurang-digital>



## Lifestyle - Changing Demand from Voice to Data to more Data

There has been a significant shift in consumers' demand and need for more data, proven by the increasing number of mobile broadband subscriptions in Malaysia. Mobile data subscription in Malaysia has shown a growth of 9.27% of 42.4 million compared to 38.8 million in 2020.<sup>36</sup>

Deploying and maintaining a resilient network infrastructure is critical in addressing the shift in demand. JENDELA is not just about coverage expansion, but also quality improvement. Quality of Experience (QoE) is critical in ensuring that Service Providers can maintain the required level of service quality to provide an excellent user experience and satisfaction.<sup>37</sup>

In a constant effort to better understand the consumers' expectations, the Broadband Quality of Experience Survey was initiated by MCMC in 2021 to:

- i. Understand and measure consumer satisfaction levels and expectations for broadband services;
- ii. Continue monitoring and improving consumer needs and expectations for broadband services; and
- iii. Identify areas of improvement for broadband services.

MCMC will carry out the survey annually to monitor Service Providers' network performance, as well as address the rising consumers' demand for better connectivity experiences.

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<sup>36</sup> <https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/MCMC-C-M-2020.pdf> and <https://www.mcmc.gov.my/en/resources/statistics/facts-and-figures-interactive-dashboard>

<sup>37</sup> QoE is measuring the network's ability to fulfil the consumer's requirements rather than Quality of Service (QoS), which focuses exclusively on network performance without regard for user experience

## The JENDELA Map

JENDELA Map is introduced as part of the initiative to improve current service coverage in users' areas, to check a Service Provider's coverage etc. JENDELA Map is also meant to allow users to provide feedback on, among others, coverage (poor/ no coverage) and quality (Internet connection). Since its launch in July 2021, there have been more than 300,000 visitors to the site. Detail on the features in the JENDELA Map such as below:

- i. Users are able to submit the feedback to improve service coverage or make a new demand for their particular area.
- ii. Do a search of the area to verify coverage for cellular services, wireless broadband, fixed broadband services, and over-the-air television. cellular services, wireless broadband, fixed broadband services, and free-to-air TV.
- iii. Users are also able to view the feedback map, which displays input from other users near the specified place.
- iv. Search the list of *Pusat Ekonomi Digital* (PEDi) locations within the specified region.
- v. Get information on the *Rangkaian Pakej* in the chosen area.

With recent enhancements, the platform now provides the user with a variety of experiences, including the ability to visualise coverage down to the Mukim layer. This demonstrates the significance of user experience in increasing the nationwide network connection.

Additionally, stakeholders are increasingly concerned about the quality of the service offering which leads to an emphasis on the consumer's experience. To meet such demand, there is a constant need to invest in infrastructure, network and technology that may also involve optimising and reconfiguring the network for the purpose of providing high-speed, reliable, and secure services at an acceptable quality of experience.

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## PEDi – Empowering Small Entrepreneurs in Digital Economy

Digital connectivity is the foundation of accelerating the digital economy. MCMC has taken a step forward in ensuring Malaysians, especially in the underserved areas, are equipped with digital skills and knowledge. *Pusat Ekonomi Digital* or better known as PEDi is an initiative by MCMC. *Pusat Ekonomi Digital* (PEDi) has been funded by MCMC through the USP Fund since 2007 and is fully operational nationwide, with 911 centres operating as of 2023.

Since its inception in 2007, PEDi has evolved from providing basic connectivity to rural and underserved areas to becoming a community digital economy and learning centre with the aim to empower the local community to participate in the digital economy. The PEDi also serves as a touch point for government and MCMC initiatives, in reaching out to local communities.

As consumers are moving towards digitalisation especially through e-commerce and cashless payments, PEDi has remained relevant to the local community by offering digital entrepreneurship training for entrepreneurs and various ICT training. The two (2) supervisors at PEDi are the fundamentals agent for change who engage and train the local communities. Their main roles are to guide and teach basic ICT skills and entrepreneurship to the local communities to adopt digitalisation in their daily life and business operations.

PEDi has also launched, *Program Pemerkasaan Pendigitalan Usahawan Kecil* (PUPUK), an entrepreneurship programme to provide guidance and training to micro-entrepreneurs in digital marketing so that they can expand their market and increase sales; and strengthen relationships between entrepreneurs' branded marketing platforms like Shopee and Aeon. The implementation of programmes under PUPUK is through smart partnership with the participating agencies and via collaboration with the private sectors, telecommunications companies, and e-commerce platform providers.

Continuous efforts are planned to bridge the digital divide between communities, especially in underserved areas including in offering expanding various programmes related to entrepreneurship through a wide network of collaboration.

### Recent Achievement on JENDELA

*On 14th March 2023, JENDELA has been selected as the winner of World Summit on the Information Society (WSIS) Prizes 2023 for the category, Information and Communication Infrastructure at the WSIS 2023 Award Ceremony hosted by the International Telecommunication Union (ITU) in conjunction with the 2023 WSIS Forum at the ITU United Nations (UN) in Geneva, Switzerland. This achievement is a recognition to the efforts put in by the Government in collaboration with numerous stakeholders, industry players and various parties to enable the rollout of digital connectivity to ensure pervasive coverage and provision of quality Internet services for Malaysians.*

## Conclusion

Advanced connectivity will provide businesses in all industries with powerful new platforms for innovation and productivity. In the decades ahead, we will see the full range of new use cases that can be built on top of this digital backbone, including some that we cannot even imagine today.

Malaysia is moving in parallel with the global trend and is preparing the industry for future advancement. MCMC is fully committed to ensuring that the communications and multimedia industry is well prepared to provide seamless connectivity to all Malaysians, as envisioned by national policies such as MYDigital, the 4th Industrial Revolution Policy (4IR), and the 12th Malaysia Plan (RMK12).

## Glossary

EPU	Unit Perancang Ekonomi, Jabatan Perdana Menteri
ICU	Unit Penyelarasan Pelaksanaan, Jabatan Perdana Menteri
KASA	Kementerian Alam Sekitar dan Air
KETSA	Kementerian Tenaga dan Sumber Asli
KKD	Kementerian Komunikasi dan Digital
KKR	Kementerian Kerja Raya
KPKT	Kementerian Pembangunan Kerajaan Tempatan
KPLB	Kementerian Pembangunan Luar Bandar
KWP	Kementerian Wilayah Persekutuan
MAMPU	Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia, Jabatan Perdana Menteri
MITI	Kementerian Perdagangan Antarabangsa dan Industri
MOE	Kementerian Pendidikan
MOF	Kementerian Kewangan
MOHE	Kementerian Pengajian Tinggi
MOSTI	Kementerian Sains, Teknologi dan Inovasi
MOT	Kementerian Pengangkutan
SMA	Sarawak Multimedia Authority

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Learn more about JENDELA at <https://myjendela.my/>

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