

Accelerating 5G in Vietnam: A Spectrum Roadmap for Success





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Executive summary



Vietnam is one of Asia's most dynamic and fast-growing nations with digital transformation already underway in many sectors of its economy. The successful completion of the 2.6 GHz and 3.5 GHz spectrum auctions in 2024 has more than doubled the amount of available mid-band IMT spectrum, paving the way for a nationwide commercial rollout of 5G. This increase – along with further awards planned

over the next two years – will accelerate the country's digital transformation and help boost its economic growth in the years ahead.

Mobile data traffic per connection in Vietnam (7.7 GB per month in 2023) has been growing strongly in recent years reflecting the country's steady economic growth and rising GDP over the past decade.

Figure 1

Vietnam mobile market – key indicators



Viettel launched the first commercial 5G network in Vietnam on 15 October 2024 across some 6,500 plus sites in 63 provinces/cities. VNPT (Vinaphone) is expected to launch later in November 2024 followed by Mobifone in early 2025.¹ However, there remains much work to be done to ensure the adequate spectrum resources to support these rollouts. Access to more mid-band spectrum in the 1-7 GHz range is crucial. The GSMA estimates that mid-bands will drive an increase of more than \$610 billion in global GDP in 2030, almost 65% of the overall socio-economic value generated by 5G. To secure these benefits, markets will need an average of 2 GHz of mid-band spectrum during this decade. Despite the successful auctions of 2.6 GHz and 3.5 GHz, there is still a significant mid-band shortfall in Vietnam, with 660 MHz assigned for mobile services.

The 5G era promises to unlock a wealth of new use cases across different industries in Vietnam, and accelerate the country's economic growth. To realise this potential, it is critical to build on current momentum and take bold decisions that prioritise 5G development, including the following actions:

- Make available additional spectrum in the 700 MHz, 2.3 GHz, 3.5 GHz and 26 GHz bands as early as practical, considering spectrum

demand to avoid creating artificial scarcity;

- Ensure reserve prices for the upcoming spectrum renewals of 900 MHz and 1 800 MHz recognise the substantial network investment made by Vietnam's mobile operators;
- Guarantee reserve prices in future spectrum auctions are set sufficiently below any market value prediction so the auctions can determine the market price through competitive bidding;
- Plan to assign more spectrum in the 3.5 GHz band as soon as possible, and certainly post-2027 when the Vinasat-1 satellite is retired from service;
- Ensure synchronisation and use of agreed frame structures for TDD networks between operators in Vietnam and in neighbouring countries to avoid interference and maximise spectrum utilisation; and
- Develop a longer-term spectrum roadmap for 2025-2030 following sector engagement. The 600 MHz, 4.8 GHz, and upper 6 GHz bands should all be considered.

1. Refer to www.nperf.com/en/map/VN/-/167.Viettel-Mobile/signal?ll=20&lg=0&zoom=3 and www.nperf.com/en/map/VN/-/21932.Vinaphone/signal?ll=15.432500881886055&lg=106.00708007812501&zoom=6

1. Introduction



In a globally connected world, communications services, underpinned by high speed and high-performance networks are integral to the operation and advancement of digital societies. This is especially true in Vietnam, which is succeeding as a regional economic leader in most metrics and recording breakout economic growth and rising real GDP per capita.² With digital transformation already underway, 5G rollouts have finally been facilitated by more than doubling the amount of assigned mid-band spectrum. This increase follows the successful completion of the 2.6 GHz and 3.5 GHz spectrum auctions in 2024, accelerating the country's digital transformation and boosting its economic growth in the years ahead.

The global importance of wireless services, including facilitating 5G adoption and planning for future technologies in the 2030 timeframe, was the backdrop to the ITU World Radiocommunication Conference 2023 (WRC-23). The Conference took strong action to meet mobile data growth by identifying additional mid-band spectrum for mobile. Final harmonisation of the 3.5 GHz band (3.3-3.8 GHz) – the pioneer 5G band – was achieved across Europe, the Middle East and Africa (EMEA) and

Americas. This harmonisation ensures a seamless deployment of 5G services in these regions. At the same time medium-term capacity requirements of mobile were largely guaranteed by WRC-23, with 6 GHz now being the harmonised home for the future of mid-band capacity.

As of Q2 2024, 285 operators in 114 markets have launched mobile 5G, while 5G fixed wireless access (FWA) services have been launched by 136 operators in 66 markets.³ 2023 saw 5G surpass 1.6 billion mobile connections globally. 2024 is expected to be another landmark year for 5G, with subscriber growth forecasted at 30%, powering the number of 5G connections to exceed 2 billion.⁴ Increasing smartphone adoption and video usage have driven mobile data traffic growth over the last decade and this trend is set to continue in the 5G era with more immersive media-rich services, new online gaming technologies and extended reality (XR) applications.

This report takes a closer look at the state of 5G spectrum planning and implementation in Vietnam and discusses the key challenges in securing sufficient spectrum resources for 5G, particularly in mid-bands. It also provides recommendations on the optimal way forward.

1.1 The Vietnam mobile market

High-speed and low-latency connectivity is becoming increasingly important for enhancing productivity, social welfare, and wellbeing. In many emerging markets there tends to be a greater reliance on wireless technology – both mobile and FWA – to meet growing demand for affordable and expandable connectivity. Vietnam has seen a remarkable growth, with mobile broadband penetration reaching 120.5% as of Q2 2024, compared to just 11.5% in 2010. Population coverage for 3G and 4G services was 99.9% at the end of 2023.

The Vietnam mobile market comprises three main players. Viettel Telecom is the leader with around 40% share of the connections. Vinaphone (VNPT) has a market share of 30% by connections and Mobifone is third with

16%. There are also two smaller operators – Vietnamobile (12%) and Gmobile (2%), both with limited spectrum holdings.

While 5G services have been available in selected areas of Hanoi, HCMC and other cities since 2023, 2024 saw an accelerated deployment of the technology nationwide. By 2030, the number of 5G connections is forecasted to exceed 90 million with 5G networks covering over 99% of the population.⁵

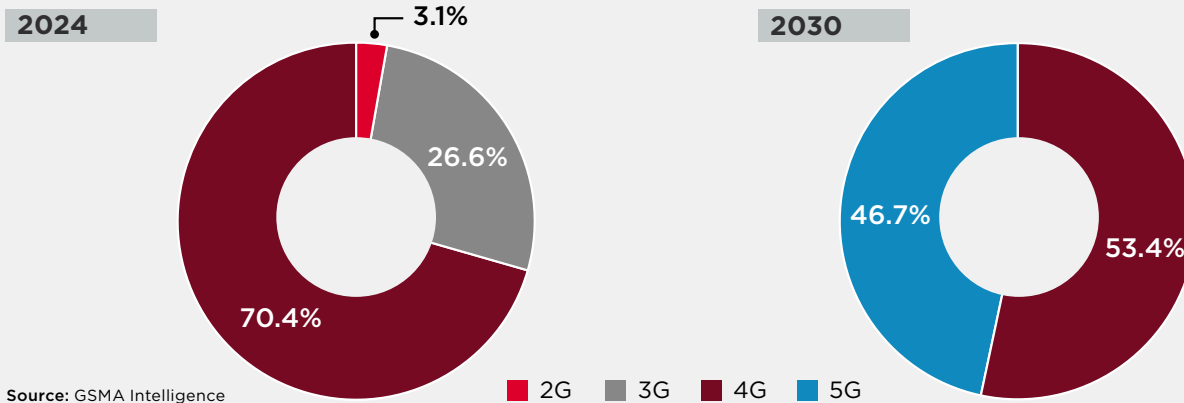
2. Source: Bain & Co, *Navigating High Winds: Southeast Asia Outlook 2024-2034*, 1 August 2024. Available at www.bain.com/globalassets/noindex/2024/bain_report_navigating_high_winds_southeast_asia_outlook_2024_34.pdf

3. Source: GSMA Intelligence. 5G in Context, Q2 2024.

4. Source: GSMA Intelligence. 5G in Context, Q2 2024.

5. GSMA Intelligence. May 2024.

Figure 2
Connections by technology in Vietnam



Source: GSMA Intelligence

Over the 2019-2024 period, mobile data usage has increased more than five-fold from 1.8 GB to 9.2 GB per month per user. This is forecasted to grow almost four-fold to 33.8 GB by 2030.⁶ Other estimates are even higher. According to Ericsson, mobile data traffic per smartphone in Southeast Asia will grow strongly and is expected to reach around 66 GB per month in 2029 – a compound annual growth rate (CAGR) of 19%.⁷

At the same time, 5G enterprise use cases are also emerging across different industrial verticals. In Asia Pacific, operators use the exceptional scale and utility of mobile networks and services to facilitate innovative digital solutions for large and small enterprises in line with Industry 4.0 objectives. 5G and IoT will play critical roles in implementing digital transformation projects across different industries, further driving demand for 5G connectivity and economic growth for the rest of the decade.

There are currently around 640 MHz of mobile spectrum assigned in Vietnam. The successful

completion of the 2.6 GHz and 3.5 GHz auctions in 2024 has more than doubled mid-band supply from 270 MHz in 2022 to 570 MHz in June 2024.

While a significant increase, it remains lower than the average of 850 MHz in the Asia-Pacific region today. There is a clear need for additional mid-band spectrum in the 2.3 GHz and 3.5 GHz bands in order to support improved 4G services as well as to facilitate higher speed 5G connectivity. In addition, the 700 MHz band should be released to support rural, remote and in-building coverage as well as supporting Vietnam’s transition to Voice over LTE (VoLTE) and Voice over 5G New Radio (VoNR).

Currently, the average speeds for 4G services in Vietnam are between 24-32 Mbps.⁸ While higher than markets like Indonesia, these are significantly below the 4G and 5G mobile offerings in places like Singapore, Philippines and Thailand, and regional leaders like Australia, Japan and South Korea.⁹

Table 1
Current IMT spectrum assigned in Vietnam

Type of spectrum	Bandwidth assigned	Bands
Low bands (sub-1 GHz)	69.6 MHz	850 MHz and 900 MHz
Mid-bands (1-7 GHz)	570 MHz	1 800 MHz, 2.1 GHz, 2.6 GHz, and 3.5 GHz

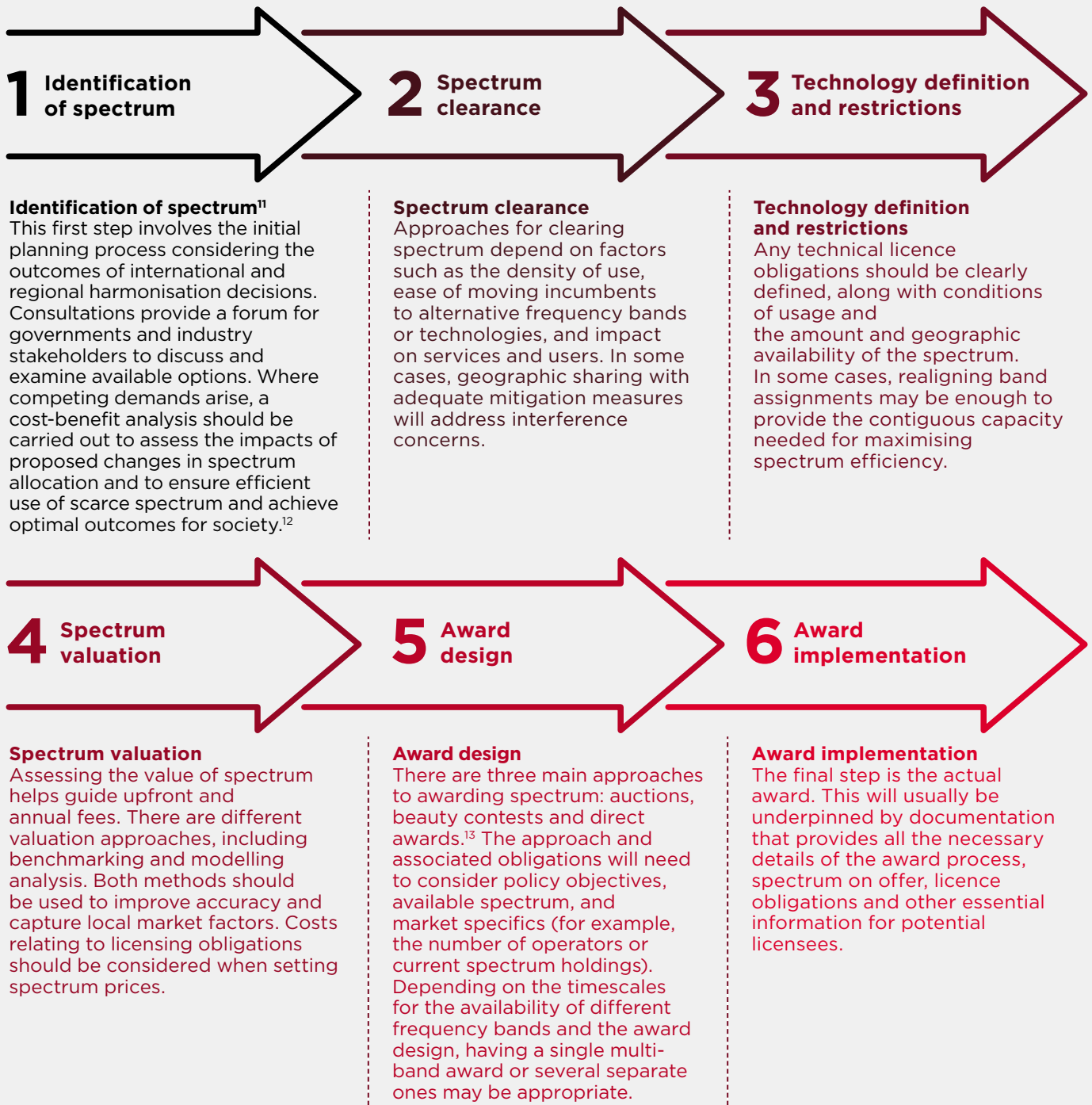
Source: GSMA, WPC. Note: It is also understood that 90 MHz of 2.6 GHz is to be assigned to Gtel for public safety mobile broadband. Gtel is owned by Global Telecommunications Corporation, a state-owned joint-stock company under the Ministry of Public Security.

6. GSMA Intelligence. May 2024.
 7. Ericsson, Mobile traffic outlook: 5G to account for 25 percent of mobile data traffic this year. Available at www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast
 8. OpenSignal. Vietnam Mobile Network Experience Report, September 2023. www.opensignal.com/reports/2023/09/vietnam/mobile-network-experience
 9. Refer to www.opensignal.com

1.2 A spectrum roadmap for 5G

As with previous generations of mobile services, the road to 5G starts with the release of spectrum. A typical spectrum roadmap, involves the following.¹⁰

Figure 3
Spectrum roadmap and steps



10. GSMA. Roadmaps for awarding 5G spectrum in the APAC region. April 2022. www.gsma.com/spectrum/resources/5g-spectrum-in-the-apac-region-roadmaps-for-success/

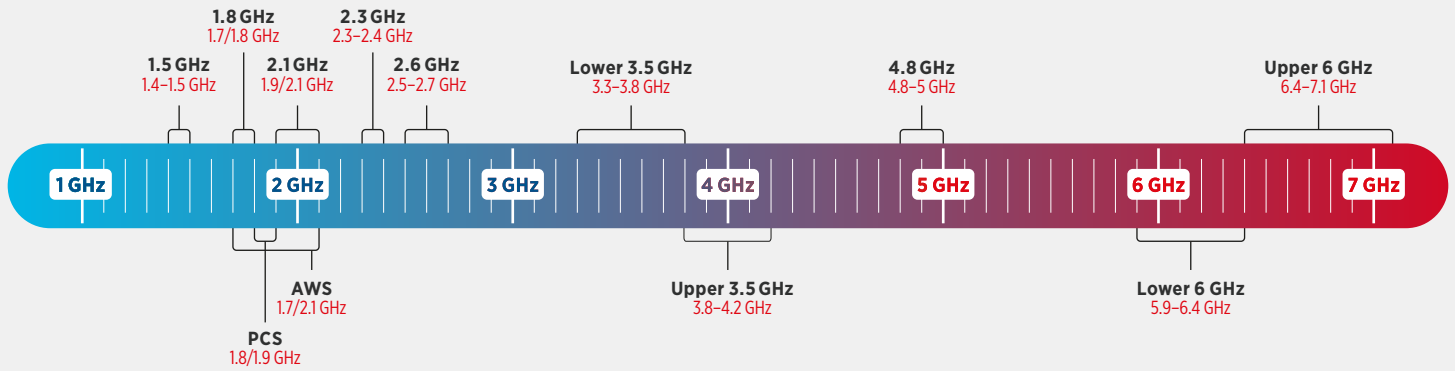
11. The key frequency bands to prioritise for 5G are outlined in section 1.3.

12. GSMA. Maximising the socio-economic value of spectrum. A best practice guide for the cost-benefit analysis of 5G spectrum assignment. January 2022. www.gsma.com/spectrum/wp-content/uploads/2022/01/mobile-spectrum-maximising-socio-economic-value.pdf

13. For the GSMA auction best practice position see www.gsma.com/spectrum/wp-content/uploads/2021/09/Auction-Best-Practice.pdf

1.3 The importance of mid-band spectrum for 5G

Figure 4
Mid-band spectrum



Source: GSMA Intelligence

Mid-band spectrum is required to meet increasing customer demand at speeds outlined in the International Telecommunication Union’s (ITU) vision for 5G, as well as future evolution. To get 5G off the ground, each mobile operator needs access to at least 100 MHz. By 2030, mobile networks will need on average of 2 GHz of mid-band spectrum per country. GSMA

research indicates that mid-band 5G spectrum has the potential to drive an increase of more than \$610 billion in global GDP in 2030, accounting for almost 65% of the overall socio-economic value generated by 5G.¹⁴ In Southeast Asia, 5G mid-band services will generate addition GDP contribution of \$35 billion (which represents 0.64% of GDP).

1.3.1 2.6 GHz and 3.5 GHz bands springboard 5G in Vietnam

The 3.5 GHz band (n77/78), which is globally harmonised for 5G, has been the basis for the pioneer phase of 5G rollouts in many markets. To date, 3.5 GHz accounts for most 5G network launches globally,¹⁵ driving the wider ecosystem,¹⁶ device diversity and competition. It has been deployed for eMBB, enabling faster data speeds and greater capacity required in urban, densely populated areas, as well as for FWA in sub-urban and rural areas where fixed broadband availability tends to be more limited.

The 2.6 GHz band, particularly the n41 Time Division Duplexing (TDD) version, has successfully supported 5G deployment globally, especially in Asia. Markets which use the n41 for 5G services include the USA, China, Thailand, the Philippines, India, Saudi Arabia and South Africa. According to GSMA Intelligence (GSMAi), 5G deployments in the 2.6 GHz band are the equal fourth most supported globally. The announced 5G device models supporting key 5G spectrum bands, n41 (2.6 GHz) had the second strongest ecosystem after 3.5 GHz, with over 1,800 device models.¹⁷

14. GSMA. *The Socio-Economic Benefits of Mid-Band 5G Services*. February 2022.

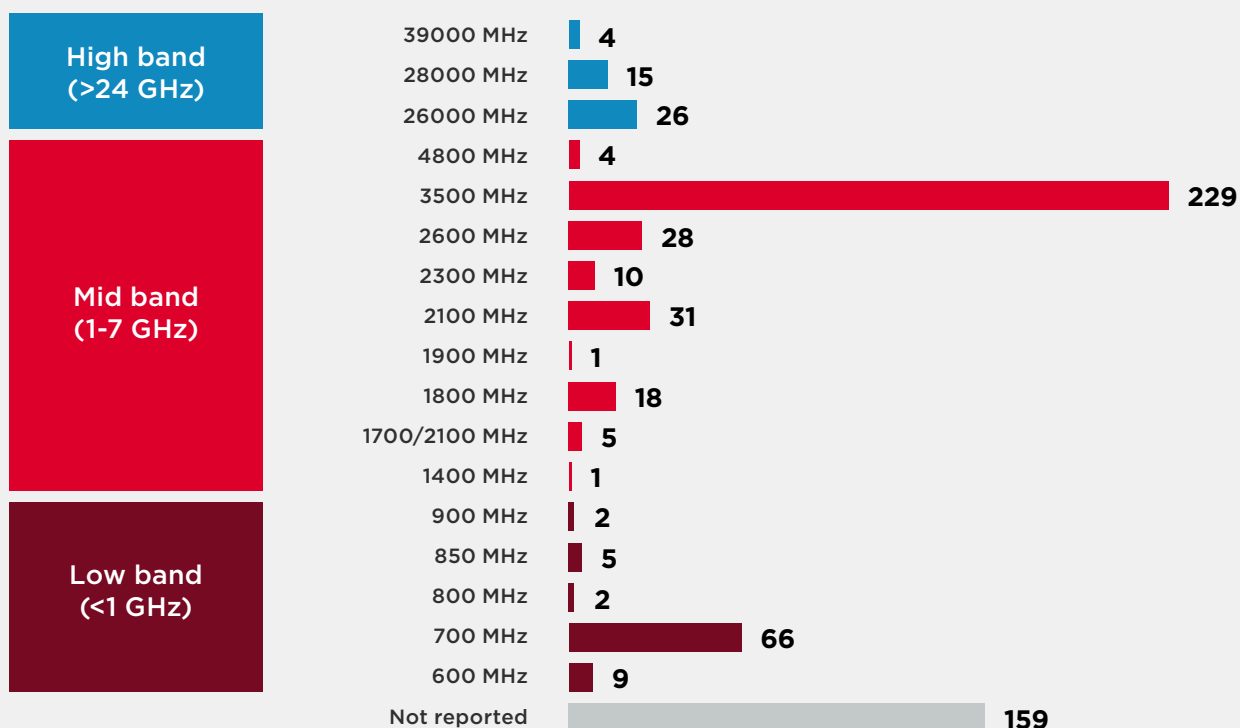
15. Excluding frequencies not reported.

16. Of the announced 5G device models supporting key 5G spectrum bands (end March 2024), n78 (3.4-3.8 GHz) 5G devices had the strongest ecosystem with nearly 2,000 device models while n77 (3.3-4.2 GHz) had over 1,600 device models and was the fourth strongest. n41 (2.6 GHz) had the second strongest ecosystem with over 1,800 device models. Refer to GSA, 5G Market Snapshot, May 2024, page 4

17. Refer to GSA, 5G Market Snapshot, May 2024, page 4



Figure 5
5G network launches by spectrum band, Q2 2024



Source: GSMA Intelligence.

Note: Figures refer to launches, not individual operators. A range of operators have launched their 5G networks on more than one frequency. If an operator has launched both mobile and fixed wireless 5G networks, then it is counted twice. 3.5 GHz band = 3.3-3.8 GHz range. 2.6 GHz band = 2.5-2.6 GHz range

2. Progress on Vietnam's spectrum plan for 5G



2.1 Spectrum management in Vietnam

The Ministry of Information and Communication (MIC) is responsible for broader telecommunications policy, including frequency spectrum management in Vietnam. The MIC has several important specialist authorities, such as the Viet Nam Telecom Authority (VNTA) and Authority of Radio Frequency Management (ARFM), operating under its auspices. The most important legislation which applies to telecommunication services, online content distribution, and internet sector has recently been updated:

- Law on Telecommunications No. 24/2023/QH15 adopted by the National Assembly of Vietnam on 24 November 2023 (“*Law on Telecommunications*”); and
- Law on Radio Frequency No. 42/2009/QH12 adopted by the National Assembly of Vietnam on 23 November 2009 (“*Law on Radio Frequency*”) and Law No. 09/2022/QH15 promulgated on 9 November 2022 (“*Radio Frequency Amendments*”).

The key role of 5G in the development of Vietnam’s digital economy is captured in Decision 36/QĐ-TTg on 11 January 2024 titled *On approving the information and communications infrastructure master plan for the period of 2021-*

2030, with a vision toward 2050 from the Prime Minister which states among other things that:

“The development requirements up to 2025 are: ... that mobile bandwidth network meets national standards ... for service quality, with a minimum average download speed of 40 Mb/s for 4G networks and 100 Mb/s for 5G networks; 100% of the adult population has a smartphone”

and

“The development requirements up to 2030 are: ... for 5G mobile broadband network to cover 99% of the population, aiming to develop the next generation of advanced mobile networks.”

The plan to implement the Information and Communications Infrastructure Planning for the 2021-2030 period, with a vision to 2050, was approved and officially effective from 7 August 2024. The plan is based on the provisions of Article 45 of the Law on Planning.¹⁸

2.2 Vietnam’s 5G spectrum planning

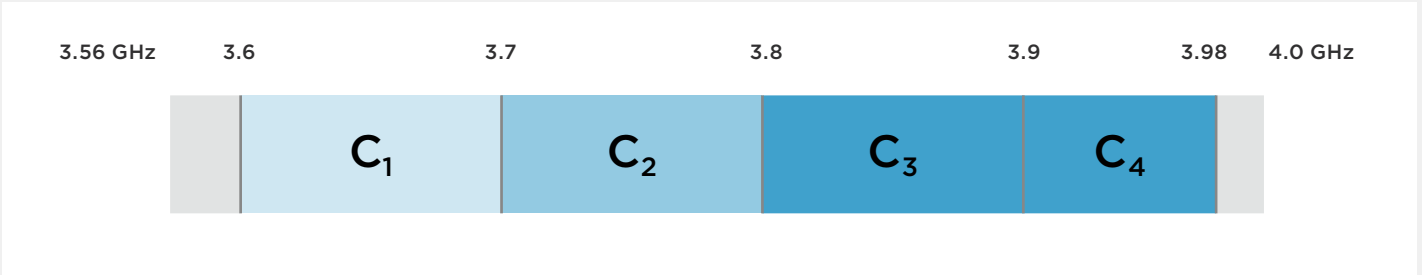
In relation to the 3.5 GHz band, the Minister issued Circular No. 13/2023/TT-BTTTT issued on 23 November 2023, detailing the 3.56-4 GHz band to deploy IMT public terrestrial mobile communication systems (referred to as IMT systems) in Vietnam.

Article 2 of the Circular required the following for the 3.5-4.0 GHz band:

- Used to develop public terrestrial mobile communication systems according to IMT-2020 standards and subsequent versions.
- Divided into four bands according to the time division duplex transmission method as follows:
 - Block C1 has a width of 100 MHz, frequency from 3.6 GHz to 3.7 GHz;
 - Block C2 has a width of 100 MHz, frequency from 3.7 GHz to 3.8 GHz;
 - Block C3 has a width of 100 MHz, frequency from 3.8 GHz to 3.9 GHz;
 - Block C4 has a width of 80 MHz, from frequency 3.9 GHz to 3.98 GHz;
- Bands 3.56-3.6 GHz and 3.98-4 GHz be used as guard bands.

18. Refer to <https://vneconomy.vn/phe-duyet-ke-hoach-thuc-hien-quy-hoach-ha-tang-thong-tin-va-truyen-thong-thoi-ky-2021-2030-tam-nhin-den-nam-2050.htm>

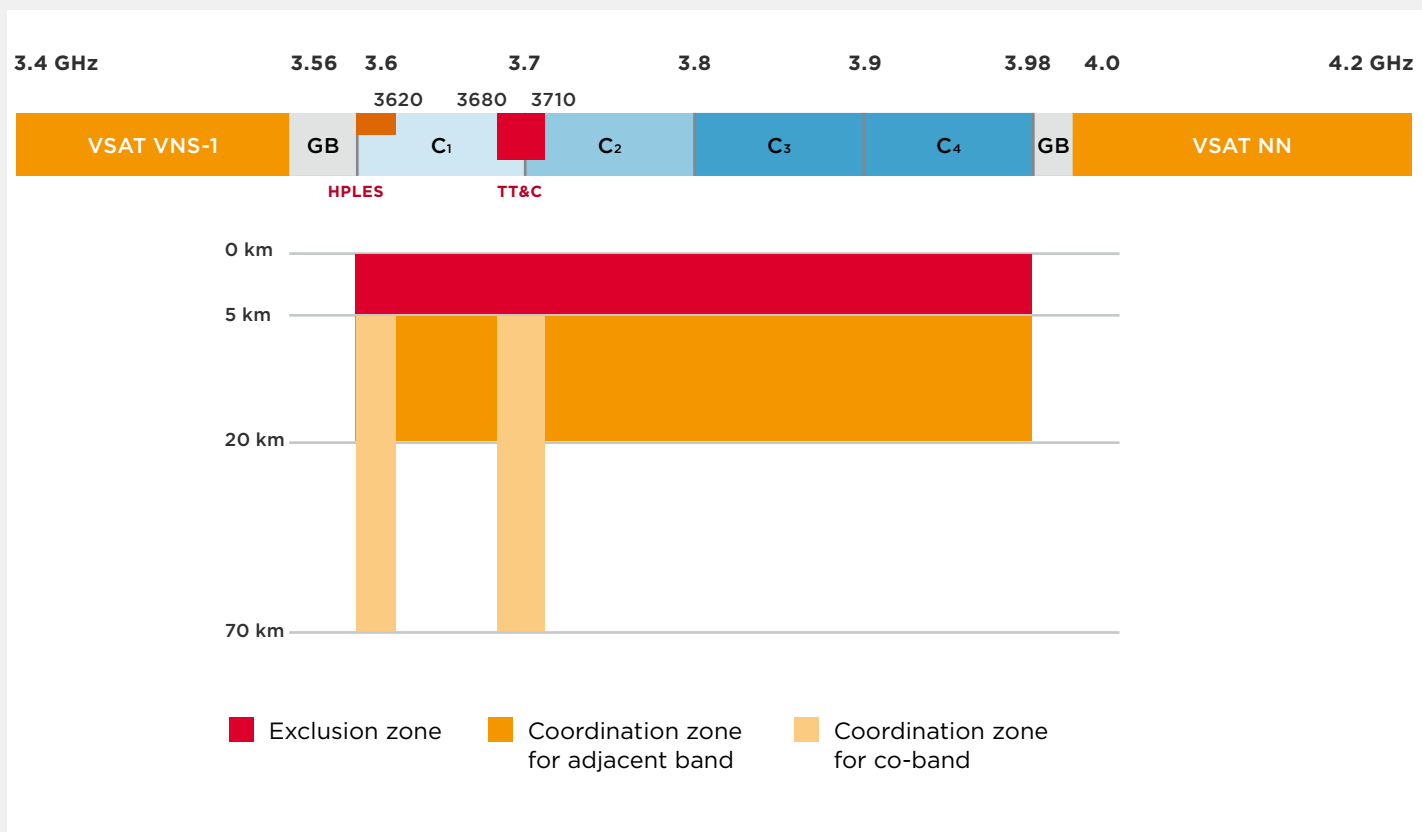
Figure 6
Vietnam’s current 3.5 GHz band plan for IMT systems



Article 2 further stipulated that, based on the ability to handle harmful interference for protective fixed and earth stations operating in the 3.4-3.56 GHz band, the MIC will decide later when to put block C1 and C4 into use.

Article 3 outlined the conditions for use of the IMT system within the 3.6-3.98 GHz band, earth stations and responsibility for coordinating the handling of harmful interference between the IMT system and other systems (refer to graphic below).

Figure 7
Coordination in the 3.5 GHz band

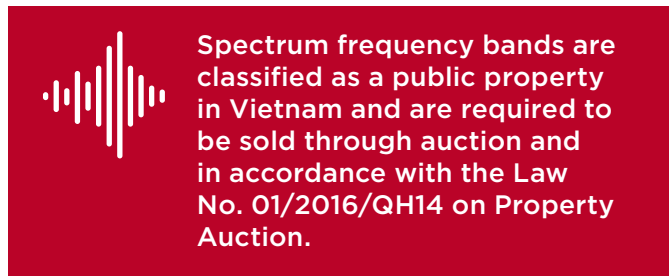


Source: MIC, 2023.

Note: HPLES is Hải Phòng Land Earth Station and TT&C is telemetry, tracking, and control TT&C is the telemetry, tracking, and control subsystem of a satellite.

2.3 Auctioning the 2.6 GHz and 3.5 GHz bands

Vietnam’s first attempt to auction spectrum took place in 2023. In February that year, the MIC presented a plan to auction the right to use spectrum in the 2.3-2.4 GHz band. However, each block had a very high reserve price of VNĐ5.8 trillion (\$228 million) which was significantly more expensive than most countries on a GDP per capita adjusted basis for similar spectrum. The plan also imposed stringent deployment conditions. Lastly, the TDD spectrum blocks offered for auction were only 30 MHz, which was insufficient for mobile operators to offer compelling 4G/5G services. All of the above – especially the very high reserve price – resulted in no Vietnamese mobile operators applying and all the spectrum remaining unsold.



Spectrum frequency bands are classified as a public property in Vietnam and are required to be sold through auction and in accordance with the Law No. 01/2016/QH14 on Property Auction.

Learning from that experience, the MIC approved a new plan to auction the 2.5 – 2.6 GHz¹⁹ and the 3.7- 3.9 GHz bands. This time with large contiguous blocks of spectrum available and reasonable reserve price (following an almost 80% price reduction), acknowledging some compelling feedback from the Vietnamese mobile industry.

Table 2
Vietnam spectrum auction (2024)

Band	Band block name	Band block width	Frequency offered
2.5-2.6 GHz	B1	100 MHz	2.5 – 2.6 GHz
3.7-3.9 GHz	C2	100 MHz	3.7 – 3.8 GHz
	C3	100 MHz	3.8 – 3.9 GHz

Spectrum auction rules

The spectrum for auction was held in three separate rounds on 8, 14 and 19 March 2024 respectively subject to the following rules:

- The format for each auction round is direct bidding, using the method of bidding up the price;
- Bidders simultaneously submit sealed bids – no bidder knows the value of other bids;
- The auctioneer announces the highest price paid and requests auction participants to continue bidding for the next round. The starting price of the next auction round is the highest price paid in the previous round;
- The auction ends when there are no more bidders;
- If two or more bidders are paying the highest price, the auctioneer shall hold another round. If the bidder does not agree to continue the auction or there is no higher bidder, the

19. Note that Vietnam has endorsed n41 TDD configuration for the 2.6 GHz band. Refer to www.sqimway.com/nr_band.php

auctioneer will organise a draw to select the auction winner; and

- Winners of one block are illegible to participate in the auction of the next block.

Successful bidders were required to deploy a minimum of 3,000 5G base stations within a two-year period. Further, within 12 months from the date of licensing, at least 30% of the number of base stations must be deployed. In Vietnam, mobile operators are expected to deploy 5G first in areas where 4G networks are no longer capable of meeting demand.

In addition, 5G is also prioritised in some industrial parks and high-tech zones, where the new generation of connectivity can bring additional economic and commercial value thanks to high speed and low latency.²⁰ While recent deployment in north Vietnam was affected by Typhoon Yagi, all operators must launch 5G by March 2025.

The licence also required a commitment to deploy networks in accordance with the national telecommunications development plan as currently contained in Decision 36/QĐ-TTg, issued on 11 January 2024 and discussed above.

Finally, the maximum total spectrum cap in the 2.6 GHz band and in the range of 3.7-3.98 GHz (when Block C1 has not yet been used) was set at 180 MHz, and in the 2.6 GHz band and 3.6-3.98 GHz (when Block C1 is used) is 200 MHz.

2024 spectrum auction outcomes

For block B1 in the 2.6 GHz band, three mobile operators (Viettel, VNPT, Mobifone) registered and participated in the spectrum auction. Compared to the unsuccessful 2.3 GHz band auction, the reserve price of B1 block was VNĐ 3,983 billion (\$156.5 million), which represented a per MHz reduction of 79%, with each price increment being VNĐ 50 billion (\$1.965 million). On 8 March 2024, MIC announced that after 24 rounds of bidding Viettel successfully acquired the rights to B1 with the final price of VNĐ 7,533 billion (\$296 million).

For Block C2 in the 3.5 GHz band, two mobile operators (VNPT, Mobifone) registered and participated in the spectrum auction. The reserve price for the C2 lot was VNĐ 1,957 billion (\$76.9 million), a per MHz reduction of 90% compared to unsuccessful 2.3 GHz band auction, with each price increment being VNĐ 25 billion (\$0.983 million). On 19 March 2024, after 17 rounds VNPT successfully acquired the rights to C2 with the price of VNĐ 2,582 billion (\$101.4 million).

For Block C3, which had the same reserve price as C2, there were not enough mobile operators registered, and the auction did not proceed.

Subsequently, on 25 May 2024, the Minister in Circular 823/QĐ-BTTTT approved ARFM plan to re-auction band block C3. On 3 June 2024, the plan for the re-auctioning of the C3 lot from 3.8-3.9 GHz was promulgated by ARFM with registration in early June 2024.²¹ The reserved price for this lot was set at the winning price of the last C2 block, namely VNĐ 2,582 billion (\$101.4 million).²² The other non-price terms were also similar. On 9 July 2024, Mobifone won the C3 band lot of spectrum for the reserve price noted above.²³

20. Refer to <https://vnexpress.net/nha-mang-ruc-rich-trien-khai-5g-4798709.html>

21. Refer to <https://mic.gov.vn/thong-bao-phuong-an-to-chuc-dau-gia-lai-quyen-su-dung-tan-so-vo-tuyen-dien-doi-voi-bang-tan-c3-3800-3900mhz-197240521164332042.htm>

22. Refer to <https://ictvietnam.vn/chuan-bi-dau-gia-tai-san-khoi-bang-tan-c3-cho-5g-64639.html>

23. Refer to <https://en.vietnamplus.vn/mobifone-wins-5g-spectrum-auction-post289933.vnp>



Current IMT spectrum assignment and future IMT spectrum availability in Vietnam

With these new spectrum assignments in the 2.6 GHz and 3.5 GHz bands, the total IMT spectrum assigned in Vietnam has risen from 339.6 MHz in mid-2022 to 639.6 MHz in May

2024. This represents an 88% increase, and it is expected to transform the country's mobile broadband service offerings.

Table 3
Current Vietnam mobile operator IMT spectrum assignments

MNO	850/900 MHz	1 800 MHz	2 100 MHz	2.6 GHz	3.5 GHz	Total MHz
Viettel	16.4	40	45	100	0	201.4
Vinaphone	16.8	40	30	0	100	186.8
Mobifone	16.4	40	30	0	100	186.4
Gmobile	0	30	0	0	0	120
Vietnamobile	20	0	15	0	0	35
TOTAL	69.6	150	120	100	200	639.6

Source: Windsor Place Consulting, Updated July 2024.

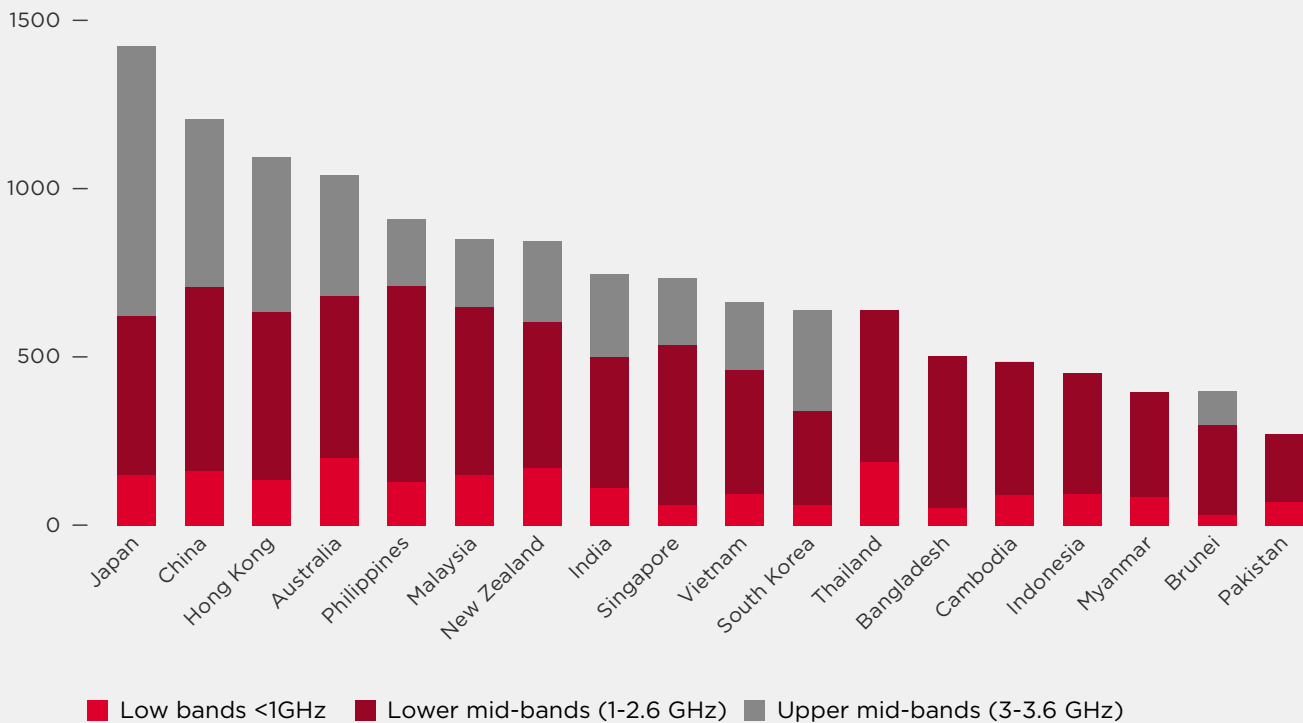
Note: It is also understood that 90 MHz of 2.6 GHz is to be assigned to Gtel for public safety mobile broadband purposes.



While the recent additions in mobile spectrum supply in Vietnam are significant, the total amount of spectrum assigned for IMT still remains below other similar markets in the Asia

Pacific and globally. This is critical as planning for future spectrum assignments for 5G requires the allocation of larger contiguous blocks of spectrum compared to previous generations.²⁴

Figure 8
Spectrum assigned to mobile operators in APAC region (MHz, 2024)



Source: GSMA Intelligence estimates based on APT and GSMA Intelligence data

24. Refer to www.gsma.com/spectrum/5g-spectrum-guide/

2.4 Future spectrum awards and renewals

The ARFM has plans to address the need for more spectrum in Vietnam. In November 2024, the MIC at the ASEAN 5G conference in Ha Long, announced that ARFM is planning to auction 2x30 MHz of 700 MHz spectrum band in early 2025 for the use of 4G or newer technologies.

Additional spectrum in the 2.3 GHz, 3.5 GHz and mmWave bands remains vacant and can be assigned by ARFM, while other bands for 5G deployment in Vietnam, including 1.5 GHz and 4.8 GHz, have been considered (as summarised below).

Table 4
Bands identified to be released for 5G in Vietnam

Band	Frequency range	Band -planning	Spectrum review	Spectrum cleared/assigned
700 MHz	703-733 MHz / 758-788 MHz ²⁵	Cleared	60 MHz	60 MHz
1.5 GHz	1 427-1 518 MHz	Considering	91 MHz	To be determined
2.3 GHz	2.3-2.4 GHz	Vacant	100 MHz	100 MHz
2.6 GHz	2.5-2.69 GHz	Cleared	190 MHz	190 MHz Assigned
3.8 GHz	3.6-4 GHz	Cleared	400 MHz	200 MHz assigned
4.8 GHz	4.8-5 GHz	Consulted	200 MHz	To be determined
26 GHz	24.25-27.5 GHz	Cleared	3.25 GHz	3.25 GHz
All bands			4.291 GHz	3.8 GHz

Source: APT, September 2021,²⁶ page 15 with updates and amendments from WPC, June 2024.

By 2024, it was planned that 5G networks will offer speeds of over 100 Mbit/s and cover industrial parks, export processing zones, schools, research zones, provinces and cities with high demand. By 2025 it is expected that 100% of the population will have 5G mobile coverage and all adults will use smartphones.²⁷

The ARFM is also planning the renewal processes for the legacy 900 MHz, 1 800 MHz and 2.1 GHz. The award process, including a decision on whether this would be an auction, a direct assignment based on international price benchmarks or a hybrid approach, is still to be determined.

25. While 2 x 45 MHz of spectrum is available, the other 2 x 15 MHz is being reserved for Government usage.

26. APT, Report on Current status and future plan of implementation and deployment of IMT-2020 (5G) in Asia-Pacific region, No. APT/AWG/REP-111, September 2021

27. Refer to <https://ictvietnam.vn/giai-phap-hien-dai-hoa-ha-tang-vien-thong-de-dot-pha-phat-trien-kinh-te-so-20220309161039944.htm>

3. Recommendations



Vietnam has taken significant steps in 2024 to make IMT spectrum available, including the assignment of 190 MHz of the 2.6 GHz band and 200 MHz of the 3.5 GHz band, and plans for 2x30 MHz of the 700 MHz band in near term. However, there remains a considerable amount of vacant IMT spectrum which could be made available in Vietnam.

The release of additional IMT spectrum would support the development of the country's digital economy and meet the government's policy

objectives in relation to 5G. Specifically, additional spectrum in the 2.3 GHz, 3.5 GHz and 26 GHz bands, could be released in large contiguous blocks in Vietnam.

The following steps for the near and medium term are recommended by the GSMA to accelerate and support the provision of affordable, high-capacity 5G services in Vietnam.

3.1 Awarding additional 5G spectrum at reasonable prices

The release of more spectrum in the 700 MHz and 3.5 GHz bands would help accelerate 5G rollout and facilitate legacy network switch-off in Vietnam. In the case of the 700 MHz band, it would facilitate both increased 5G coverage at the most efficient cost as well as improving in-building penetration.²⁸ Concurrently, additional mid-band spectrum like the 3.5 GHz would support wireless broadband provisioning in Vietnam's rapidly growing urban centres.

Urbanisation has played a vital role in Vietnam's success, with the share of the population living in towns and cities increasing from less than 20% in 1990 to more than 37.5% in 2022.²⁹ It is forecasted that HCMC will grow to over 12.2 million residents in 2035, while Hanoi will expand to over 7.1 million people.³⁰

To meet future demand, it is recommended that MIC/ARFM publish, and regularly update, a spectrum roadmap for at least five years detailing what bands will be made available, and when. This will give operators confidence that policymakers support future mobile broadband growth and encourage sustainable, long-term investment.³¹

It is also important that reserve prices for future spectrum auctions in Vietnam be set sufficiently below any prediction of market value, to allow the auction to fulfil its purpose of determining the market price through competitive bidding.

Where demand does not exceed supply, alternative measures should be adopted – even if this means legislative change to the *Public Auction Law*. Otherwise, there is a risk of overestimating spectrum value and setting reserve prices or fees too high. Crucially, previous auction results should not set a precedent for future auctions, other than in special circumstances, to avoid artificially inflating prices. Benchmarking based on final prices in comparable markets is usually considered when assessing the value of spectrum, as done in Vietnam in 2023/24. However, in practice, even slight differences in local conditions between countries can make these comparisons widely inaccurate. There can also be a temptation to choose the highest benchmarks leading to negative outcomes for consumers and the digital economy. The failed 2023 spectrum auction in Vietnam is an example of this.

Overall, the rising cost of spectrum is unsustainable and will be a major threat to the future competition of mobile services in Vietnam, as seen in other ASEAN markets, such as Thailand and Indonesia.

If the cost and required amount of spectrum to meet demand are rising, while operator revenues per MHz of spectrum are falling, it will be increasingly unsustainable to fund future high-quality networks.

28. As Vietnam is only proposing to make 2 x 30 MHz of the 700 MHz band (n28) available rather than 2 x 45 MHz, there is greater probability that they will be in need for the 600 MHz (APT600/n105) than other ASEAN markets which release the entire n28 band.

29. Refer to <https://www.gso.gov.vn/px-web-2/?pxid=VO202&theme=Dân%20số%20và%20lao%20động>

30. Refer to <https://vietnam.opendevelopmentmekong.net/topics/urbanization-in-vietnam>

31. GSMA. Roadmaps for awarding 5G spectrum in the APAC region. March 2022.

Other changes needed to create more flexibility for the release of new IMT spectrum include:

- **Create more but smaller lots in the auction**, which will allow auctions to proceed even if there are fewer bidders. This way, Vietnam can avoid the recent problem with the C3 lot auction, where there was only one bidder for this lot. For example, instead of 1x100 MHz lot, bidders may be able to bid on 10x10 MHz lots; and
- **Allow both virtual lots and restacking after the auction to create larger contiguous**

blocks. At present, the auction law requires the actual frequency block to be specified (i.e. generic lots in a band are not permitted). No changes are allowed in the assignment after the auction for a specified period. Changes in this respect will allow more flexibility for operators to bid for and assemble the required blocks of spectrum. It should also facilitate the adoption of spectrum auction techniques, such as clock auctions utilising software, which de facto are impossible under the existing legal frameworks.

3.2 Cross-border coordination

Geography and population density mean that cross-border interference issues regarding the 700 MHz, 2.6 GHz and 3.5 GHz bands for Vietnam are more likely to exist with Cambodia than with any of its other neighbours.

This is because the Annamese mountain range³² known in Vietnamese as Dãy Trường Sơn, extends approximately 1,100 km through Lao PDR, Vietnam, and northeast Cambodia. Likewise, the border between Vietnam and China to the north is predominantly through isolated mountainous areas. These geographic features, combined with relatively lower population densities along those mountainous borders, mean that the heavily populated Mekong delta region in southern Vietnam is the most challenging from a cross-border spectrum management perspective.

Need for 700 MHz band coordination

As part of the analogue to digital television migration, the 700 MHz band has been fully cleared in Vietnam. However, as Cambodia has yet to undertake its digital television migration, there will be a need for cross-border frequency coordination given the likely harmful interference to IMT services in Vietnam from analogue and digital terrestrial television broadcasting services in Cambodia. Such interference is likely to be finite in duration as the current Cambodian plan is for the migration to digital television and 2x45 MHz of 700 MHz spectrum to be awarded in Q1 2026.

Need for 2.6 GHz band coordination

In relation to the 2.6 GHz band, Vietnam has assigned IMT spectrum based on the TDD n41 band plan. While this is similar to China (China Mobile is using its 2.6 GHz spectrum for 4G and 5G services), Vietnam's ASEAN neighbours Cambodia and Lao PDR currently utilise the hybrid FDD/TDD configuration (b7/b38) for 4G services in this band. This raises possible co-channel interference between FDD and TDD services and synchronisation issues between TDD networks as the Cambodian border is only 55 km from HCMC.³³

As both Thailand and Vietnam use n41 in the 2.6 GHz band there would be significant benefits for Cambodia in transitioning its 2.6 GHz band channel plan to TDD but the commercial/technical viability of such a transition will depend on the number of 2.6 GHz FDD deployed sites by Metfone and Smart Axiata in Cambodia. The likely interference between Vietnam and Lao PDR in relation to the 2.6 GHz band is likely to be minor given the geography of their shared border and population densities.

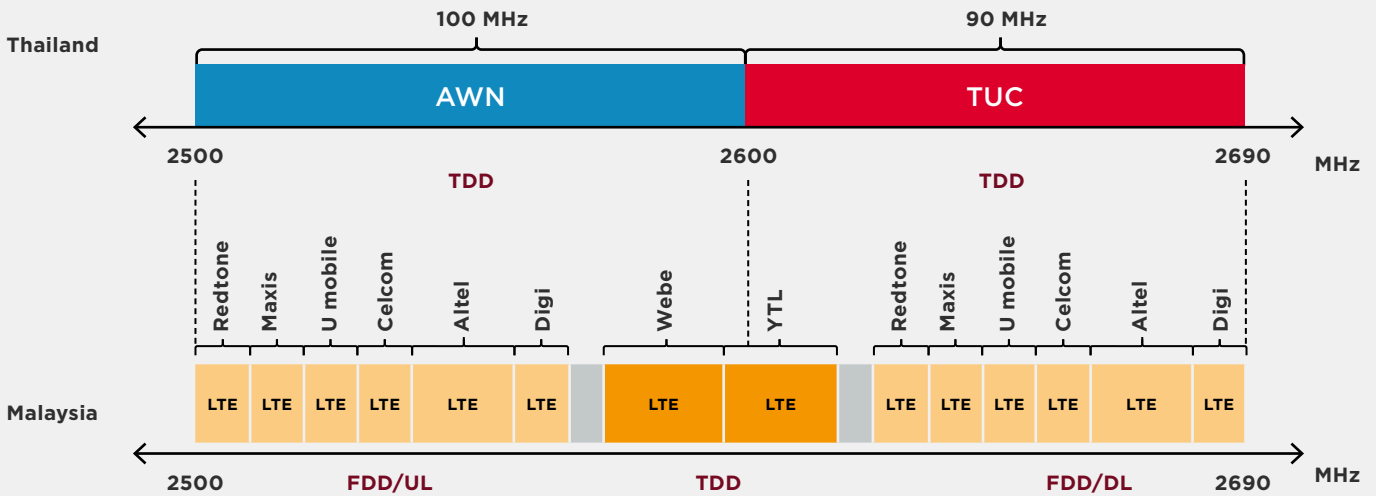
Thus, a suggested approach to deal with this interference is for Vietnam to adopt the coordination parameters in relation to the 2.6 GHz band which have been agreed between Malaysia and Thailand. Similar approaches could be adopted in relation to the 2.3 GHz and 3.5 GHz bands.³⁴

32. Refer to www.britannica.com/place/Annamese-Cordillera

33. Refer to www.cuctanso.vn/content/tintuc/Lists/News/FW.aspx?ItemID=2903

34. Alternatively, when operators deploy TDD 2.6 GHz (n41) and FDD 2.6 GHz (n7), the co-ordination distance of TDD and FDD sites should be less than 1km with back to back transit and signal level limited less than -110dBm. Ideally, Vietnam and Cambodia should synchronise their TDD 2.6 GHz networks; otherwise 10 km isolation distance is likely to be required.

Figure 9
Malaysia-Thailand agreed cross-border coordination approaches



Source: GSMA Intelligence estimates based on APT and GSMA Intelligence data

Table 5
Malaysia-Thailand cross-border coordination

Frequency band	Technology	Coordination parameters	
		Signal level (dBm)	Defined distance from the border (km)
2.6 GHz	LTE/5G TDD - LTE (FDD)	-120 dBm/5 MHz	1 km
	LTE/5G TDD - LTE (TDD)	ECC Rec (11)05/ ECC Rec (14)04	1 km

Source: JTC Thailand-Malaysia 17 May 2021

Vietnam and its neighbouring countries have undertaken various information exchanges on frequency and 5G deployment plans, joint testing of interference situations, and assessing solutions to prevent harmful interference. It is important

to continue these discussions to ensure that all operators and relevant stakeholders have the requisite information for the planning of their 5G deployment.

3.3 Specific issues related to the 3.5 GHz band

As detailed above, there are significant challenges for Vietnam to make further 3.5 GHz band available for 5G services, especially in the quantum needed to address the country's mid-band spectrum demand.

Supply – Additional 3.5 GHz spectrum can be released in the future subject to the clearance and/or the implementation of adequate mitigation measures. If a phased approach is taken, all the spectrum released during such a process should be subject to a condition for refarming to create larger contiguous blocks of spectrum.³⁵ The aim is for the largest three mobile operators to be able to initially secure at least 100 MHz of contiguous spectrum in this band for competition reasons.

As demand increases and more 3.5 GHz band spectrum becomes available in Vietnam, additional 3.5 GHz band spectrum should be made available permitting mobile operators to have up to 200 MHz or more spectrum assigned in this spectrum band.

Clearance and/or mitigation measures –

To facilitate the release of 3.5 GHz, there is a need to accelerate clearance or to introduce adequate mitigation measures to ensure coexistence with incumbent users in the band.

In addition to guard bands, other possible measures to ensure coexistence between IMT and FSS services include:³⁶

- Earth station site shielding;
- Restriction zones to protect FSS;
- Improved FSS receivers;
- Addition of filters to FSS receivers;
- IMT base station location limits;
- Reduced base station transmitter power; and
- Detailed coordination.

With many advanced markets across Europe, North America and Asia Pacific³⁷ assigning up to 500 MHz or more of 3.5 GHz spectrum, Vietnam can set the example in Southeast Asia by increasing the supply of 3.5 GHz spectrum for IMT to the full 380 MHz in the period up to 2027 and plan for future expansion.

3.4 Optimal approaches to TDD synchronisation

5G deployment has seen the introduction of TDD networks for the first time in Vietnam. All TDD networks, whether they are 4G or 5G, operating in the same frequency range and within the same geographic area have to be synchronised.

Synchronisation is the best way to ensure efficient spectrum usage and to avoid harmful interference, which has a major impact on network performance and coverage. This is well-understood by ARFM, and Decree 13 /2023/ TT-BTTTT of 23 November 2023 provides in Article 2(3) regarding the 3.5 GHz band that *“Organisations licensed to use the frequency band in the 3.6-3.98 GHz band are responsible for synchronising the data frames of the TDD method and coordinating with other organisations licensed in this band to avoid harmful interference”*.

To ensure coexistence at a national level, it is strongly recommended that all 5G networks operating within the 2.6 GHz and 3.5 GHz range use synchronisation parameters. The choice of synchronisation parameters is influenced by the required network performance, whether there are incumbent users in the band and the approach of neighbouring countries.³⁸

The amount of observed traffic on 4G and 5G networks between the user device and the base station (the uplink) and vice versa (the downlink) is often asymmetrical. Thus, the typical approach is to agree to a 3:1 (downlink:uplink) profile. The recommended national frame structure for Vietnam in the future for the 3.5 GHz (n77/78) band is set out below. This frame structure could also be adopted by Viettel and GTel for the 2.6 GHz band for 5G services.

35. It is understood that this is currently not possible given the provisions of Public Auction Law but subsequent legislative amendments (including spectrum trading) should facilitate this process.

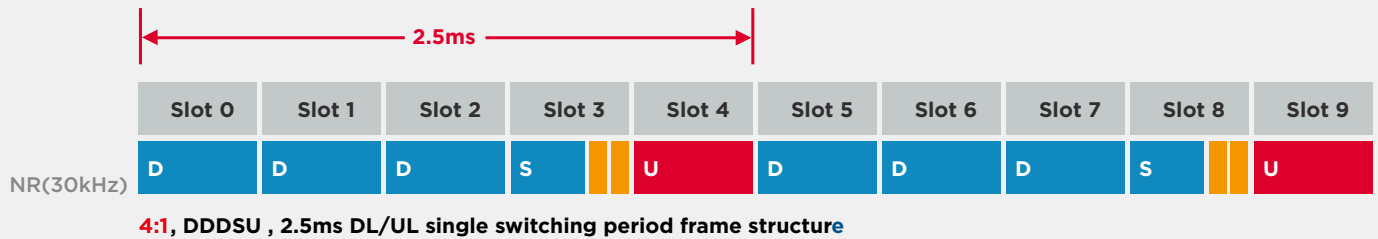
36. GSMA, *Roadmap for C-Band Spectrum in ASEAN*, August 2019, page 5

37. In another regional example, Australia has undertaken a defragmentation of the 3.5 GHz band and significantly increased the quantum of 3.5 GHz band allocated for 5G/IMT services. Refer to <https://www.acma.gov.au/allocating-34-40-ghz-band>

38. Refer to CEPT, *ECC Report 296, National synchronization regulatory framework options in 3400-3800 MHz: a toolbox for coexistence of MFCNs in synchronised, unsynchronised and semi-synchronised operation in 3400-3800 MHz*, 8 March 2019. Available at <https://docdb.cept.org/download/1381> and GSMA, *5G TDD Synchronisation, Guidelines and Recommendations for the Coexistence of TDD Networks in the 3.5 GHz Range*, April 2020. Available at www.gsma.com/spectrum/wp-content/uploads/2020/04/3.5-GHz-5G-TDD-Synchronisation.pdf

Figure 10

Recommended national frame structure for 3.5 GHz spectrum

Source: GSMA, *Roadmap for C-Band Spectrum in ASEAN*, August 2019, page 73

However, if 4G/LTE TDD networks are to be deployed in the 2.3 GHz and 2.6 GHz bands, a 5 ms frame structure of 8:2 (DDDDDDDSUU) should be adopted to be compatible with LTE

TDD networks. This may be necessary in the early days of deployment and to address cross-border issues with Cambodia, China and Lao PDR.

3.5 Future IMT spectrum needs in 2025-2030

It is also important to recognise that the 5G journey is only just starting. For the rest of the decade and beyond, 5G will become central to mobile connectivity and underpin Vietnam's digital transformation and economic growth. The sixth generation of mobile systems, popularly referred to as 6G, are expected to be commercially available in the 2030 timeframe. It is essential for policymakers and regulators to take a longer-term view on spectrum supply, especially in the mid-bands.

By 2030, an average of 2 GHz of mid-band spectrum will be needed to deliver 5G services at a performance consistent with the ITU's IMT-2020 (5G) requirements.³⁹ At present, only around 660 MHz of mid-band spectrum has been assigned for IMT in Vietnam. Even with the release of the 2.3 GHz and additional 3.5 GHz band, the total supply of mid-bands in Vietnam at approximately 1 GHz will still be twice less than the 2 GHz required for IMT by 2030.

Thus, the following actions are recommended for Vietnam:

- Assess options for expanding the supply of spectrum for 5G in the 2025-2030 timeframe, particularly in the mid-bands. These can include the release of unassigned spectrum in existing mid-bands such as the 3.5 GHz band and identification of new spectrum in potential future bands;

- Assign the use of 4.8 GHz to support 5G services, including for enterprise services;
- Plan for the use of upper 6 GHz (6 425–7 125 MHz) to support further development of 5G and future IMT evolution towards 2030;
- Clear additional 3.5 GHz band spectrum down to 3.3 GHz post the retirement of Vinasat-1 services in 2027; and
- Make the 600 MHz band available as currently planned by ARFM in 2029.

In this context, it is important for Vietnam to develop a long-term national spectrum roadmap covering at least till 2030. This roadmap which can be updated annually would incorporate ARFM's work on the release of different frequency bands, information on evolving trends in technology and spectrum use, and harmonisation and standardisation activities.

This information will be critical for businesses to prepare investment plans, secure financing and develop arrangements for deploying particular technologies. In this way, Vietnam will be optimally positioned to support the longer-term growth of 5G and to realise its full socio-economic benefits for all citizens and enterprises across all sectors of its rapidly growing economy.

39. Coleago Consulting. Estimating the mid-band spectrum needs in the 2025-2030 time frame, July 2021. Available at <https://www.gsma.com/spectrum/wp-content/uploads/2021/07/Estimating-Mid-Band-Spectrum-Needs.pdf>



3.6 Other important issues

The MIC endorsed a plan to begin sunsetting 2G and 3G networks from 2024 onwards which will allow operators to refarm existing holdings to deploy 4G/5G services. From September 2024, 2G services are planned to be switched off nationwide and there is a target for 3G to be switched off in 2028.^{40, 41} From 1 March 2024, new 2G-only phones would not be able to connect to networks of the Vietnamese mobile operators.⁴² To facilitate the process, Viettel firstly offered subsidised smartphones and free smartphones to its customers with legacy 2G-only devices.⁴³

A main challenge to the sunset of legacy networks is the need to migrate services with a long lifecycle, such as some M2M services (e.g. point of sale payment terminals). While since September 2024, circuit switch fall back (CSFB) is available for voice calls on the 3G networks of the mobile operators, post 2028 all voice calls will need to be connected on 4G or 5G via VoLTE or VoNR respectively.

The implementation of VoLTE can be associated with many technical challenges. Essentially, VoLTE is a data service. However, in contrast to typical best-effort IP data traffic that can be reduced if the link is of low quality, VoLTE requires a guaranteed data rate. The network responds to these situations by allocating more capacity resources to the VoLTE call, which may cause the overall quality of the network to degrade. As such, LTE radio access networks (RAN) may need to be re-optimised to provide the required VoLTE service guarantees.⁴⁴ Further complications arise if the 4G/5G coverage is not as continuous as it was with 2G/3G legacy services.

A technical guide to VoLTE implementation has been prepared by the GSMA,⁴⁵ as well as a guide to 2G/3G network sunseting.⁴⁶

40. Refer to MIC Circulars 04 /2024/TT-BTTTT THÔNG TƯ, 10 May 2024, Quy hoạch băng tần 880-915 MHz và 925-960 MHz cho hệ thống thông tin di động mặt đất công cộng IMT của Việt Nam, Article 4(2) and 03 /2024/TT-BTTTT, 30 April 2024, Quy hoạch băng tần 1710-1785 MHz và 1805-1880 MHz cho hệ thống thông tin di động mặt đất công cộng IMT của Việt Nam, Article 4(2)

41. Refer to 12/2023/TT-BTTTT, 10 October 2023 Quy hoạch băng tần 1920-1980 MHz và 2110-2170 MHz cho hệ thống thông tin di động IMT của Việt Nam, Article 2(2)

42. Source: Nguyen Huy Cuong, ARFM, *Roadmap to 5G*, 10th Asia Pacific Spectrum Management Conference, Jakarta, 23 April 2024, pages 4 and 11

43. Source: <https://e.vnexpress.net/news/business/economy/vietnam-all-set-to-pull-the-plug-on-2g-phones-4715309.html>; <https://e.vnexpress.net/news/business/companies/viettel-to-gift-4g-phones-to-700-000-2g-subscribers-4795412.html>

44. Refer to www.gsma.com/spectrum/wp-content/uploads/2020/06/Legacy-mobile-network-rationalisation.pdf specifically page 10.

45. Refer www.gsma.com/get-involved/working-groups/wp-content/uploads/2023/07/VoLTE-Implementation-Guide-July-2023.pdf

46. Refer to www.gsma.com/get-involved/working-groups/key-topics/volte-roaming

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