

S4: Appendix D - Strategic Plan of/for The Ministry of Communication and Informatics (KOMINFO)

In response to a directive from the president, the Ministry of Communication and Information's (KOMINFO) five-year strategic plan has adopted the concept of digital transformation as its overarching topic for 2020–2024. Digital infrastructure, digital governance, digital economy, and digital society are the four pillars of digital transformation. The goals of KOMINFO's strategic plan for 2020–2024 are to strengthen national resilience and political stability of security defence law through access to information and public communication; to increase geostrategic competitiveness through digitalization; to promote inclusive growth by encouraging digital transformation in the economic and government sectors; and to prepare the digital ecosystem and human resources of digital talents. Implementation is limited to five programs, including the provision of ICT infrastructure; frequency spectrum management, device standards, and public services; ICT utilization; public communications; and support for management as shown in Figure S10.

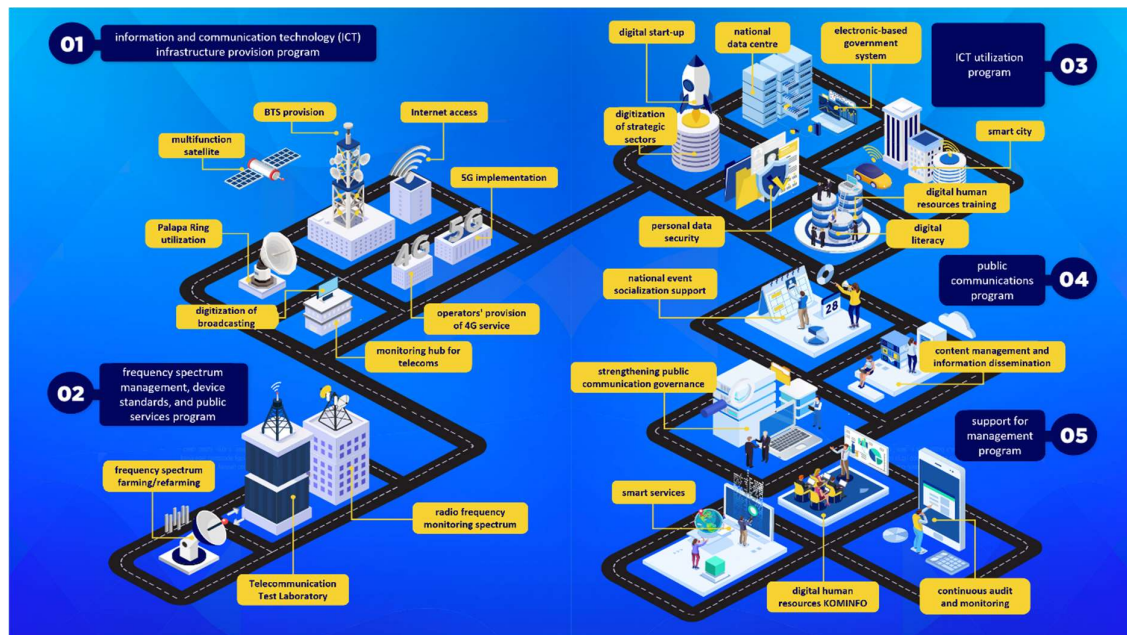


Figure S10. Strategic Plan Programs Year 2020-2024, translated into English from [17]

A Novel Grid-Based Implementation Proposal

In the Strategic Plan, the Ministry of Communication and Informatics (KOMINFO) determines thirteen 5G pilot project cities. The thirteen pilot project cities include 1 new national capital (IKN), 6 provincial capitals on the island of Java (Banten: Serang, DKI Jakarta: Jakarta, West Java: Bandung, Central Java: Semarang, DIY: Yogyakarta, East Java: Surabaya), 5 super priority tourism destinations (DPSP) (covering Toba Lake, Likupang, Borobudur, Mandalika, Labuan Bajo), and 1 manufacturing industrial area [17]. As for administratively, IKN is located in two districts, namely North Penajam Paser Regency (Penajam and Sepaku Districts) and Kutai Kartanegara Regency (Loa Kulu, Loa Janan, Muara Jawa, and Semboja Districts). The current grid position, determined by this study, is displayed in Table S2. It shows the number of grids from the thirteen 5G pilot project cities, which are currently not all in grid category #4 (independent advanced districts). The complete grid category for 7232 Indonesian districts as a result of our novel framework can be accessed in Intellectual Property (copyright No. EC002022107232 date 15 December 2022) document [33]. Related to KOMINFO's Strategic Plan, Figure S11 shows the Indonesian 5G roadmap resume in the thirteen 5G Pilot Project Cities.

Table S2. The Thirteen 5G Pilot Project Cities Grid Proposal

No.	5G Pilot Project Cities	Number of Districts or Grid				
		#1	#2	#3	#4	Total
1.	IKN	0	1	4	1	6
2.	Serang	0	4	23	8	35
3.	Jakarta	0	0	5	39	44
4.	Bandung	0	1	21	39	61
5.	Semarang	0	1	10	24	35
6.	Yogyakarta	0	1	2	11	14
7.	Surabaya	0	0	3	28	31
8.	Toba Lake consists of 4 cities:	0	30	18	2	50
	Samosir,	0	6	3	0	9
	Humbang Hasundutan / Humbahas,	0	7	3	0	10
	Tapanuli Utara,	0	9	5	1	15
	Toba Samosir / Tobasa.	0	8	7	1	16
9.	Likupang in North Minahasa	0	3	6	1	10
10.	Borobudur in Magelang	0	4	13	7	24
11.	Mandalika in Central Lombok	0	0	10	2	12
12.	Labuan Bajo in West Manggarai	0	8	3	1	12
13.	Manufactural Industry Area (the location has not yet been set)	N/A	N/A	N/A	N/A	N/A

The existing cellular bands used are 450/850/900/1800 MHz and 2.1/2.3 GHz. Since we applied neutral technology, all cellular bands are applicable to be used in each of the grids. But in order to accelerate 5G implementation, especially in grid #4, we need the additional/new band in 700 MHz and 2.6/3.3/3.5/26 GHz. Indonesia utilizes a telecom license for neutral technologies. MNOs are free to employ the optimal

technology (2G, 3G, 4G, 5G, etc.). Therefore, the service areas of the existing MNOs are dynamically distinct for each technology.

We recommend a set of strategic steps to expedite the rollout of 5G in Indonesia consisting of:

1. Grouping districts based on our four-grid concept: grid #4 or independent advanced district, grid #3 or developed district, grid #2 or developing district, and grid #1 or fostered district.
2. List the areas that require specific policies, such as:
 - a) Push policy
is intended to encourage investment climate in commercial areas that already have a 4G signal in order to optimize the network or transition to 5G using existing cellular frequency bands. Push policy implementation:
 - The regulation/policy approach of grid #4 (independent advanced district ~ very high commercial area) differs from that of other grids because the direction of development and investment will develop spontaneously in this area. Due to the high demand on grid #4, there must be an encouragement to satisfy the capacity (speed and bit rate) requirements of telecommunication signal users.
 - There is a market void in grid #3 (developed district), so signal coverage must be optimized and equalized. This policy is, of course, located at (i) existing main cities and their environs; (ii) international event sites.
 - b) Pull policy
is intended to entice regions that are not commercially attractive due to geographical obstacles or local socioeconomic conditions until excellent infrastructure is established. Pull policy implementation:
 - There is an Accessibility Gap in grid #2 (developing districts) and in grid #1 (fostered district). Gap access is a signal condition and the presence of low or even non-existent telecommunication infrastructure. Not all districts in grids #2 and #1 need this policy. This policy must be selective and reflect the policy direction of the country's highest leadership (affirmative and top-down policy). This policy can be implemented for example in thirteen government-specified 5G pilot project cities.
3. In order to accelerate time-to-market, we must utilize the 3.5 GHz band, which is the largest 5G ecosystem in the world today. The issue, however, is the use of satellites in that band. So the concept is
 - a) grid #4 and grid #3 are suitable for 5G on a primary basis and satellite on a secondary basis, conversely

- b) grid #2 and grid #1 are suitable for satellites on a primary basis and 5G on a secondary basis.

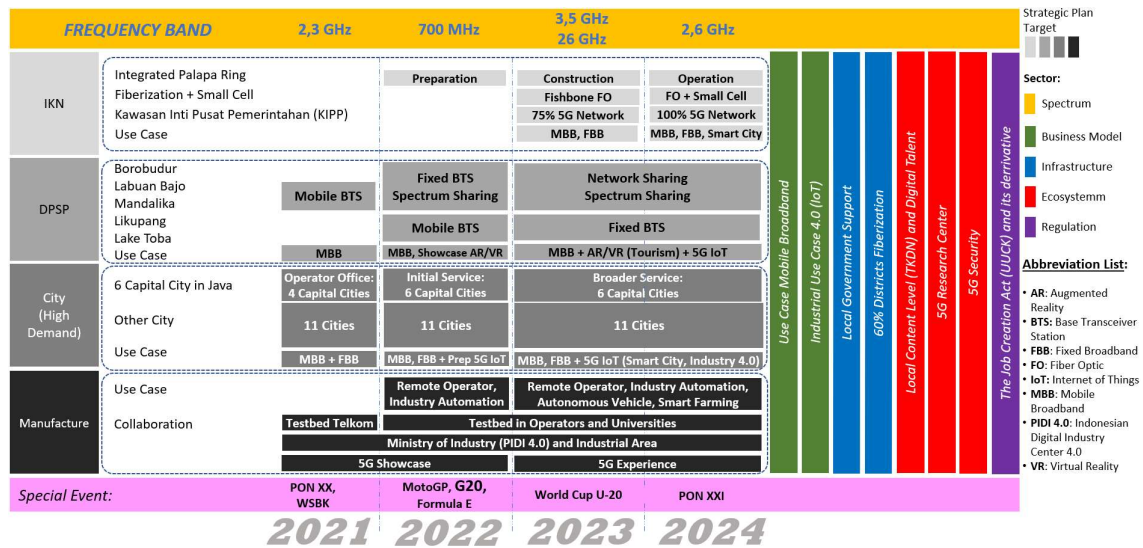


Figure S11. Indonesian 5G Roadmap Resume in The Thirteen 5G Pilot Project Cities

REFERENCES

- [17] Minister Regulation on Ministry of Communications and Informatics Strategic Plan Year 2020-2024 (in the original language (Bahasa): "Peraturan Menteri Komunikasi dan Informatika Nomor 2 Tahun 2021 tentang Rencana Strategis Kementerian Komunikasi dan Informatika Tahun 2020-2024"), 2, Kementerian Komunikasi dan Informatika: Jakarta, Indonesia, 2021; pp. 51–52. Available online: <https://peraturan.bpk.go.id/Home/Details/169164/permenkominfo-no-nomor-2-tahun-2021-tahun-2021> (accessed on 5 January 2023).
- [33] Christina, A.; Gunawan, D.; Suryanegara, M. "An Indonesian District-Level Database Comprised of 17 Telecommunication Network and Socioeconomic Indicators (in the original language (Bahasa): "Basis Data Kecamatan Se-Indonesia Berdasarkan 17 Indikator Jaringan Telekomunikasi Dan Sosial Ekonomi") with Copyright Number EC002022107232 ". Ministry of Law and Human Rights: Jakarta, Indonesia, 2022. Available online: <https://pdki-indonesia.dgip.go.id/detail/EC002022107232?type=copyright&keyword=Basis+Data+Kecamatan+Se-Indonesia+Berdasarkan+17+Indikator+Jaringan+Telekomunikasi+Dan+Sosial+Ekonomi> (accessed on 1 January 2023).