



Impacts of Cancelling the 5G 28GHz Spectrum Allocation

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ICT Sector Funding Plan for 2024 and Frequency Assignment Revenue Status

- The Korean government's ICT funds include two primary components: the Broadcasting Communications Development Fund, established under Article 24 of the Framework Act on Broadcasting Communications Development ("Broadcasting Development Fund"), and the Fund for Promotion of Information and Communications, as defined in Article 41 of the Information and Communications Technology Industry Promotion Act ("Information Promotion Fund").
- The ICT sector fund in 2024 is set at KRW 2.6324 trillion, which signifies a reduction of KRW 411.1 billion (13.5%) compared to 2023.
 - The Broadcasting Development Fund is allocated KRW 1.2527 trillion, marking a decrease of KRW 228.1 billion (15.4%) from 2023.
 - The Information Promotion Fund is allocated KRW 1.3797 trillion, with a decrease of KRW 183 billion (11.7%) from 2023.

[Table 1] The ICT Sector Fund Revenue Plan for 2024

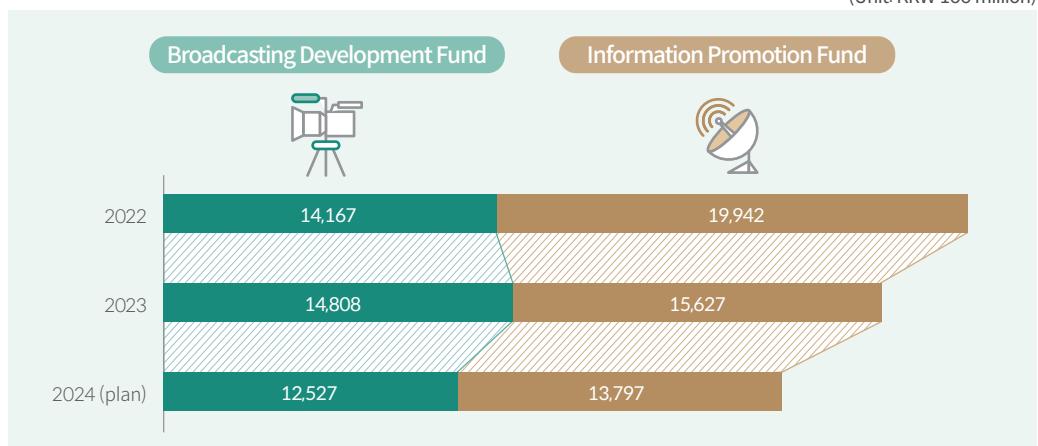
(Unit: KRW 100 million, %)

Classification	Year-end 2022	2023 Plan (A)	2024 Plan (B)	Increase / Decrease (B-A)	Ratio (B-A)/A
ICT sector funds	34,109	30,435	26,324	-4,111	-13.5
① Broadcasting Development Fund	14,167	14,808	12,527	-2,281	-15.4
② Information Promotion Fund	19,942	15,627	13,797	-1,830	-11.7

Source: Ministry of Science and ICT

[Figure 1] Revenue of the Broadcasting Development Fund & the Information Promotion Fund in 2022-2024

(Unit: KRW 100 million)



- **The 2024 reduction in ICT sector funding is attributed to a significant 48.8% year-on-year drop, amounting to KRW 871.1 billion, in ‘considerations for frequency assignment,’ which is a primary revenue source for both funds.**
 - Revenue projection from frequency assignment in 2024 is KRW 915.2 billion, marking a KRW 871.1 billion (48.8%) fall from the 2023 forecast of KRW 1.7863 trillion.
 - In 2024, ‘considerations for frequency assignment’ will constitute 32.9% of the Broadcasting Development Fund’s revenue and 36.5% of the Information Promotion Fund’s revenue. The remaining revenue primarily comes from inter-governmental transactions, including the reclamation of surplus funds.
- **Revenue from considerations for frequency assignment tends to vary greatly year-to-year, influenced by whether there are new assignments.**
 - In 2018, revenue from the allocation of new 5G frequencies reached KRW 1.7 trillion. In the subsequent two-year period (2019–2020), this figure was KRW 1.1 trillion.
 - In 2021, revenue generated from the reassignment of 3G-LTE frequencies amounted to KRW 1.8 trillion, while in 2022, it was KRW 1.0 trillion.

[Table 2] Revenue from Frequency Assignment from 2017 to 2022

(Unit: KRW trillion)

Classification	2017	2018	2019	2020	2021	2022
Considerations for frequency assignment	8,109	17,007	11,291	10,760	18,160	10,120
Changes over the previous year	-4,892	8,898	-5,716	-531	7,400	-8,040
(Ratio)	(-37.6)	(109.7)	(-33.6)	(-4.7)	(68.8)	(-44.3)

Source: Ministry of Science and ICT

<Note> Frequency Assignment & Related Considerations

- (Assignment Process) Under Article 2, Paragraph 1, Subparagraph 3 of the Radio Waves Act, the government allocates frequencies, valuable national resources, and in return collects compensation.
 - (Assignment Methods) Frequencies are typically assigned through competitive bidding. In cases without competitive demand, frequencies are assigned for considerations, subject to approval.
 - (Payment Terms) At assignment, 25% of the total consideration is paid upfront, with the remaining balance paid in equal annual installments from the following year until the end of the usage term, including interest on these installments.
 - (Allocation of Revenue) Funds from these considerations are distributed between the Broadcasting Development Fund (45%) and the Information Promotion Fund (55%).
- (Reassignment) Reassignment refers to allocating a frequency to its current user once its usage period ends, as stipulated in Article 16, Paragraph 1 of the Radio Waves Act.

Current Status of 5G Frequency Assignment

- **In 2018, the Ministry of Science and ICT (MSIT) allocated 5G frequencies in the 3.5 GHz and 28 GHz bands to three mobile carriers.**
 - (Conditions of Allocation) The assignment stipulates that carriers must establish 22,500 base stations in the 3.5 GHz band and 15,000 in the 28 GHz band within three years.
 - Periodic assessments will be conducted in the 3rd and 5th years. Non-compliance with the stipulated number of base stations will lead to penalties, which may include the revocation of frequency assignments and a 10% reduction in the usage period. Additionally, previously paid considerations for the assignments may be withheld.

[Table 3] Network Building Requirements for 5G Frequency Assignments

Classification	Assignment Period	Baseline Number of Orders for Construction ¹⁾	Mandatory Number of Orders for Construction (cumulative) ²⁾	
			Within 3 years (15%)	Within 5 years (30%)
3.5GHz	10 years (2018–2028)	150,000 stations	22,500 stations	45,000 stations
28GHz	5 years (2018–2023)	100,000 units ³⁾	15,000 units	–

Note: 1) This includes base stations for which opening reports of wireless stations are mandatory (such as optical repeater base stations).

2) The timeline designates 2019 as Year 1, with Year 3 falling in 2021 and Year 5 in 2023.

3) The data is based on the equipment installed and reported at the base stations upon their opening.

Source: Ministry of Science and ICT

- (Considerations) The three mobile carriers have pledged to pay a combined total of KRW 622.3 billion over a five-year period for the 28 GHz band assignment.

- KT: KRW 207.8 billion, LGU+: KRW 207.2 billion, SKT: KRW 207.3 billion.

<Note> 5G Frequency Bands Characteristics and Use Cases

- Radio wave properties dictate that higher frequencies enable larger data transmissions but over shorter distances.
 - Compared to the 3.5 GHz band, the 28 GHz band covers shorter distances, making it ideal for high-volume data processing in limited areas.
 - The 28 GHz band is crucial for maximizing 5G features like ultra-high speed, ultra-low latency, and hyper-connectivity.

Band range	Use cases
Below 1 GHz	Ideal for wide coverage, supporting hyperconnected services like the Internet of Things
1 GHz to 6 GHz	Balance substantial coverage with data processing capabilities
24 GHz and above	Focused on securing extremely wide bandwidth for delivering high-capacity services

Source: Ministry of Science and ICT

Consumption Propensity Across Different Age Groups of Household Heads

- In 2022, the MSIT completed a three-year post-assignment performance review of the 5G frequency allocations.

- The three mobile carriers successfully fulfilled their network construction requirements in the 3.5 GHz band. However, their achievements in the 28 GHz band were only about 10% of the set obligations.

[Table 4] Network Building Progress of the Three Mobile Carriers in Each 5G Frequency Band

Classification	3.5GHz			28GHz		
	Building Obligation (A)	Actual Performance (B)	Completion Ratio (B/A)	Building Obligation (C)	Actual Performance (D)	Completion Ratio (D/C)
SKT	22,500 stations	77,876 stations	346.1%	15,000 units	1,605 units	10.7%
KT	22,500 stations	65,918 stations	293.0%	15,000 units	1,586 units	10.6%
LGU+	22,500 stations	66,367 stations	295.0%	15,000 units	1,868 units	12.5%

Source: Ministry of Science and ICT

Actions Following Performance Review Outcomes

- As a result of the performance review, the MSIT revoked the 5G 28 GHz band frequency assignments from KT and LGU+ in December 2022, and from SKT in May 2023.

- KT and LGU+ did not fulfill their required obligations and scored below 30 points in the evaluation, leading to the cancellation of their assignments. In the final decision made in December 2022, it was confirmed that they had only completed about 10% of their required network building.

- SKT, during the December 2022 review, was not immediately required to have its assignment cancelled. However, due to inadequate construction progress, their usage period was reduced to six months with a grace period extending to May 31, 2023, leading to the final cancellation of their assignment in May 2023.

- **Initially, the MSIT intended to reassign the 28 GHz band frequency after its assignment period ended in 2023. This plan was, however, scrapped following the dismissal of all three mobile carriers from the assignment.**

- A revenue stream was anticipated from a 25% upfront payment as part of the reassignment considerations, which was to benefit both the Broadcasting Development Fund and the Information Promotion Fund. But with the cancellation of the reassignment plan, this expected revenue fell short of the initial projections.

Plans for New Allocation of the 28 GHz Band

- **Following the cancellation of the 28 GHz band assignment to the three mobile carriers, which precluded reassignment, the MSIT is exploring options to allocate frequencies to new operators beyond these carriers.**

- Key dates include the announcement of the assignment on July 20, an application period from November 20 to December 19, and the assignment to new businesses, which is yet to be determined.

- There is still uncertainty regarding the potential involvement of new players apart from the existing three mobile carriers.

Implications of the 28 GHz Assignment Cancellation (1): Unmet Policy Objectives

- **Despite the government's Intelligent Network Construction Strategy (Dec. 2017) aiming for a nationwide 5G network by 2022, this target was not reached.**

- The government's December 2017 announcement set out to transition from a 4G LTE-based network to a nationwide 5G network by 2022.

[Table 5] Timeline for Nationwide 5G Mobile Telecommunications Development

Classification	2018	2019	2020-2021	2022
5G mobile telecommunications	Assignment of Frequencies	Commencement of Commercial Network Operations	⇒	Target Year for Nationwide Network Completion

- Although Korea led the world in launching 5G in 2019, its exclusion from the list of nations with fully supplied ultra-high frequency bands followed, owing to the three mobile carriers abandoning their 28 GHz band construction plans.

[Table 6] Nations with Fully Supplied 5G High Frequency Bands

Year of Completion	Countries
2018	Italy, San Marino, (South Korea)
2019	United States, Japan, Hong Kong, Uruguay
2020	Taiwan, Singapore, Thailand, Finland, Russia, Greece, UAE
2021	Australia, Brazil, Denmark, Chile, Slovenia, Croatia
2022	India, Spain, Bulgaria
2023 (as of October)	Estonia, Israel

Note: 1) South Korea was initially listed in 2018 but was later removed due to the cancellation of the 28 GHz band assignments for its three mobile carriers.

2) This list includes only countries and the city-state of San Marino, but excludes territories like those of the US and specialized networks.

Source: Reconstructed based on materials submitted by the Korea Information Society Development Institute (KISDI)

Implications of the 28 GHz Assignment Cancellation (2): Korea's Diminishing Network Leadership

- Korea's status as a network powerhouse has diminished, now ranked sixth in Kearney's 5G Readiness Index of 33 countries with 5G commercialization.
- As per Kearney's 2023 5G Readiness Index, released in June 2023, Korea is positioned behind the US, Singapore, Finland, Japan, and Norway.

[Table 7] 5G Readiness Index Rankings

Classification	1st	2nd	3rd	4th (Tie)		6st
Country	US	Singapore	Finland	Japan	Norway	Korea
Index Score	8.4	7.6	7.3	7.1	7.1	6.9

Source: Kearney's 2023 5G Readiness Index, June 2023

[Figure 2] 5G Readiness Index Status by Country



Source: Kearney's 2023 5G Readiness Index, June 2023

Implications of the 28 GHz Assignment Cancellation (3): Growing Consumer Costs

- With an increase in 5G subscribers, the high pricing of 5G plans relative to service quality is leading to increased telecom expenses for consumers.
- Despite 5G's potential for 20 times the speed and one-tenth the delay of 4G, actual service quality evaluations fall short of these theoretical benchmarks.
 - The average maximum speed for 5G is 1,557.41 Mbps, just 4.1 times faster than 4G's average maximum (381.47 Mbps), achieving only 20% of its theoretical speed improvement (20 times).
 - The average 5G latency is 17.89 ms, half that of 4G, but still not meeting its target metric of being one-tenth of 4G latency

[Table 8] Evaluation of 5G Service Quality

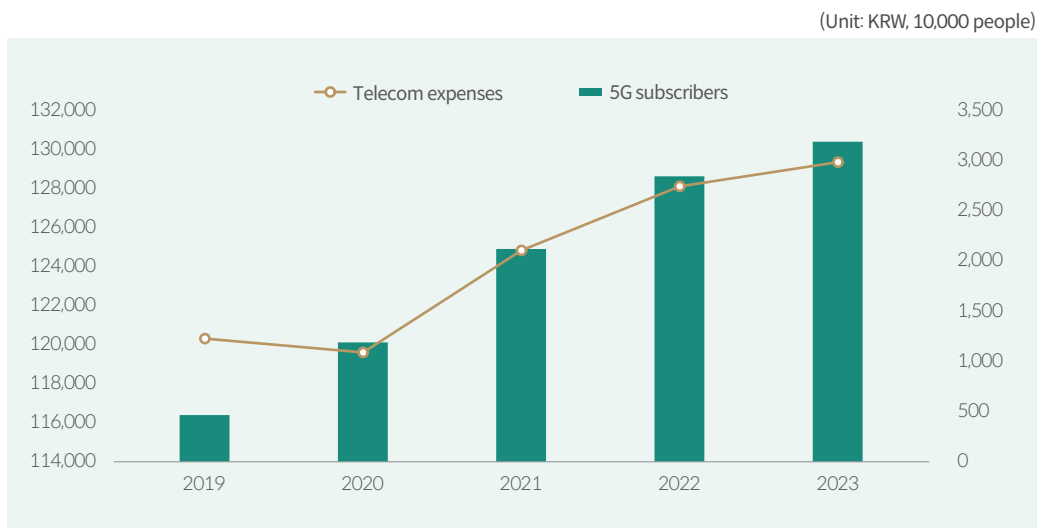
Classification	Maximum Download Speed		Latency	
	Theoretical Standards	Quality Evaluation Results ¹⁾	Theoretical Standards	Year 5 (30%)
5G (A)	20 Gbps	1,557.41 Mbps	1 ms	17.89 ms
4G (B)	1 Gbps	381.47 Mbps	10 ms	32.66 ms
Ratio (A/B)	20 times	4.1 times	0.1 times	0.5 times

Note: 1) The top download speed in quality evaluations was observed at KTX stations (SKT) at 1,877.99 Mbps. The 1,557.41 Mbps represents the average of the highest download speeds recorded by the three mobile carriers.

Source: Reproduced by NABO using data from the Strategy for Building Intelligent Networks (Dec. 2017) and The Results of Telecommunications Service Coverage Review and Quality Assessment in 2022 (Dec. 2022) by the MSIT

- From 2019 to August 2023, the total number of 5G users in the country surged from 4.67 million to 31.15 million. Concurrently, the average monthly telecommunication costs for households rose by 7.4%, from KRW 120,462 to KRW 129,379.
- As of October 5, 2023, monthly rates for the three mobile carriers' 5G plans, not including those targeted at specific age groups (like children, youth, and seniors), range between KRW 34,000 and KRW 130,000.¹⁾ These rates are about 1.23 to 1.53 times higher than those for LTE plans, which lie between KRW 22,000 and KRW 105,000.

[Figure 3] Trends in 5G Mobile Telecommunications Subscribers and Average Monthly Household Telecom Expenses in Korea



Note: The 2023 average monthly telecom expenditure data is derived from the first quarter of the year.

Source: Ministry of Science and ICT, Statistics Korea

1) The price range for 5G plans includes mid-tier plans introduced by the three mobile carriers from last year up to the first half of 2023.

Implications of the 28 GHz Assignment Cancellation (4): Increased Profits for Mobile Carriers

- **Post-5G commercialization, the operating profits of the carriers have risen, while their capital expenditure has not seen a significant increase.**
 - Their operating profits grew from KRW 2.9455 trillion in 2019 to KRW 4.3835 trillion in 2022. However, capital expenditure has consistently hovered around KRW 8.2 trillion annually since 2020.²⁾
 - Compared to the 2021 average capital expenditure-to-revenue ratio of 22.2% for OECD telecom companies, Korea's ratio is considerably lower at 13.9%.³⁾
 - The carriers' failure to establish the required 28 GHz network led to higher profits, as they avoided equipment expenses and charged higher rates for services.
 - Furthermore, with the 28 GHz assignment revoked and no reassignment, they were exempted from the financial obligations of frequency assignment and construction costs that would have been incurred with reassignment.
 - The MSIT noted that before the final decision to cancel the 28 GHz assignment, the carriers acknowledged their responsibility for not meeting the conditions during a public hearing, yet did not challenge the cancellation.
- **In May 2023, the Fair Trade Commission (FTC) found that the 5G service speed advertisements by the three mobile carriers were unfair, leading to the imposition of corrective actions, orders for public announcements, and fines.**
 - SKT was fined KRW 16.829 billion, KT KRW 13.931 billion, and LGU+ KRW 2.85 billion, totaling KRW 33.61 billion.
 - The FTC concluded that the carriers falsely and deceptively exaggerated their advertising, claiming that consumers could access the theoretical maximum speed of 20 Gbps of 5G technology, which is not achievable in real-world conditions.
- **Currently, three consumer civil lawsuits are ongoing against these carriers at the Seoul Central District Court for their misleading advertising practices. These include two cases of unjust enrichment and one for damages.⁴⁾**

Implications of the 28 GHz Assignment Cancellation (5): Impact on ICT Funds Revenue

- **The decision not to reassign the 28 GHz band to the three mobile carriers in 2023 means missing out on the initial 25% lump sum payment, leading to a shortfall in ICT sector fund revenues for this year and the next five years.**
 - Revenue has fallen by about KRW 750 billion⁵⁾ compared to the 2023 fund management plan. To offset this, plans include reclaiming surplus funds and borrowing from the Postal Insurance reserves.
 - Future revenue from installment payments for frequency assignment will also diminish due to this cancellation.
 - The total amount paid by the three carriers for the 28 GHz frequency assignment from 2018 to 2023 was KRW 630.4 billion. The funding gap from 2023 to 2028, resulting from the abandoned reassignment, is expected to be similar in magnitude.

2) Source: Chosun Biz article dated September 6, 2023, titled "Doesn't work in Seoul, frequently disconnected... Three telecom companies to hit KRW 5 trillion in operating profits this year despite lack of investment"

3) Source: Chosun Biz article dated September 6, 2023, titled "Doesn't work in Seoul, frequently disconnected... Three telecom companies to hit KRW 5 trillion in operating profits this year despite lack of investment"

4) Source: Press release by the FTC, "Decision on Unfair 5G Advertising Practices by Two Telecom Companies Issued," August 17, 2023.

5) The decline in 2023's frequency assignment revenue, compared to projections, is attributed not only to reduced revenue from the 28 GHz assignments but also to the decreased income from new 5G frequency allocations.

Implications of the 28 GHz Assignment Cancellation (6): Diminished Technological and Industrial Edge

- The withdrawal of the three mobile carriers from the 28 GHz bands might hinder the development of high-frequency band utilization services and equipment industries. This is particularly concerning as the 5G 28 GHz equipment and terminal ecosystem, currently in its nascent commercialization stage, is expected to grow post-2025.⁶⁾
- Many research institute analyses suggest that a 28 GHz network is essential for delivering ultra-high-speed 5G services. Therefore, canceling the 28 GHz frequency assignment in Korea could restrict leveraging the unique capabilities of 5G technology.

[Table 9] Future Prospects for 28 GHz Bands and Related Technologies

Category	Analysis Summary
Signal Research Group	Millimeter wave 5G offers speeds approximately 18 times faster than LTE, ensuring high-quality video service in busy areas.
Open Signal	Analysis shows millimeter wave achieving average speeds 20 times faster than LTE.
Bell Lab	Implementing a 28 GHz network across 2,000 UK hotspots (including 50 stadiums, 100 train stations, 250 shopping malls) could benefit 24% of the population daily.
Global System for Mobile Communications Association	The 28 GHz bands are cost-effective for high-performance in hotspot areas. • In densely populated regions, if 25% of subscribers use this service, the costs are projected to decrease by 35% in Europe and 28% in China.

Source: FY2021 Committee-specific Analysis of the Settlement of Accounts (Science, ICT, Broadcasting, and Communications Committees) of NABO, published in August 2022.

- With the anticipated utilization of ultra-high frequency bands in the forthcoming 6G era, the expertise and technology developed through 28 GHz applications are crucial. The lack of progress in these areas might hinder preparations for the transition to 6G.

6) Counterpoint Research (October 2021)