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Traffic Development Index (TDI)

Partnered with:

OMDIA

HUAWEI

Contents

Summary

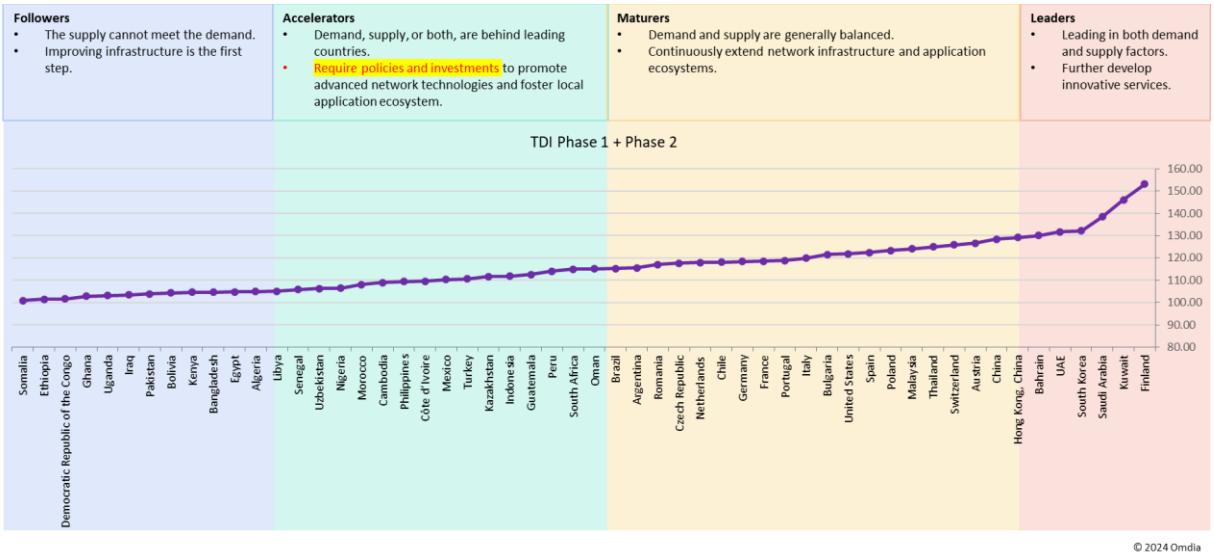
Digitalization is transforming the global economy and society, driving innovation, economic growth, and job creation. Data has become the lifeblood of modern businesses and organizations. Data traffic over communication networks is becoming a key indicator of an economy's dynamics. Data traffic volume can reflect the size and vitality of an economy, the adoption of digital services and technologies, and the availability of digital infrastructures, among other factors. Additionally, the growth in data traffic can be a sign of an economy's development momentum.

However, the growth rate of global cellular data traffic has been consistently decreasing. This decrease is not only a natural result of the maturing mobile internet ecosystem in developed markets but also a sign of disparities in development on both the demand and supply sides of digital economies. Analyzing the demand and supply sides can offer a holistic view of data traffic development and provide guidance on solutions to boost cellular data traffic growth. This information can assist authorities and industry players in making informed decisions regarding their strategies and policies.

Therefore, Omdia collaborated with Huawei to define the Traffic Development Index (TDI), which indicates a country's relative position compared with benchmarked countries. A layered model was created to assess the development of cellular data traffic in the country from both the demand and supply sides

54 countries and territories from the Americas, Asia & Oceania, Europe, and Middle East & Africa were studied and benchmarked. According to their TDI scores, these countries and territories can be categorized into four groups (**Figure 1**).

Figure 1: TDI Ranking of 54 countries and territories



Source: Omdia

The TDI scoring system identifies and analyzes countries with significant imbalances between traffic demand and infrastructure supply. Based on the analysis results, recommendations are given. The case studies of four countries serve as examples, illustrating how the TDI scoring and ranking can help the industry and authorities in understanding each country's market conditions. This understanding can then inform strategies and policies aimed at promoting traffic development.

The global telecoms industry is experiencing a return to growth. Strong demand in the market will drive a steady rise in data traffic. Omdia expects that cellular data traffic will increase more than threefold over the next five years while the global average data traffic per month will more than double. Experience-based tariff models and artificial intelligence (AI) applications will create new opportunities for service providers to monetize their mobile broadband networks and become new boosters for data traffic growth. True 5G networks, equipped with mid-band 5G radio and a 5G standalone (SA) core, will enable service providers to support growing traffic demand and provide differentiated services.

Data traffic is a key indicator of an economy's dynamics

Digitalization is transforming the global economy and society, driving innovation, economic growth, and job creation. According to the World Bank's *Digital Progress and Trends Report 2023,* the world gained 1.5 billion new internet users between 2018 and 2022, particularly in low- and middle-income countries. Digital technologies have greatly improved access to timely information for households and individuals while also lowering transaction costs. This has enhanced educational outcomes, increased labor force participation, and boosted income, consumption, and overall welfare. For businesses, digital technologies can improve decision-making, increase efficiency, facilitate innovation, and expand markets.

Among various economic sectors, the information and communication technology (ICT) sector has become a primary growth engine of the global economy, consistently outperforming the total economy. According to the *OECD Digital Economy Outlook 2024 (Volume 1)*, the ICT sector has grown about three times faster than the total economy in Organization for Economic Cooperation and Development (OECD) countries over the past decade. In 2023, the ICT sector reached new heights, growing 7.6% on average across the OECD.

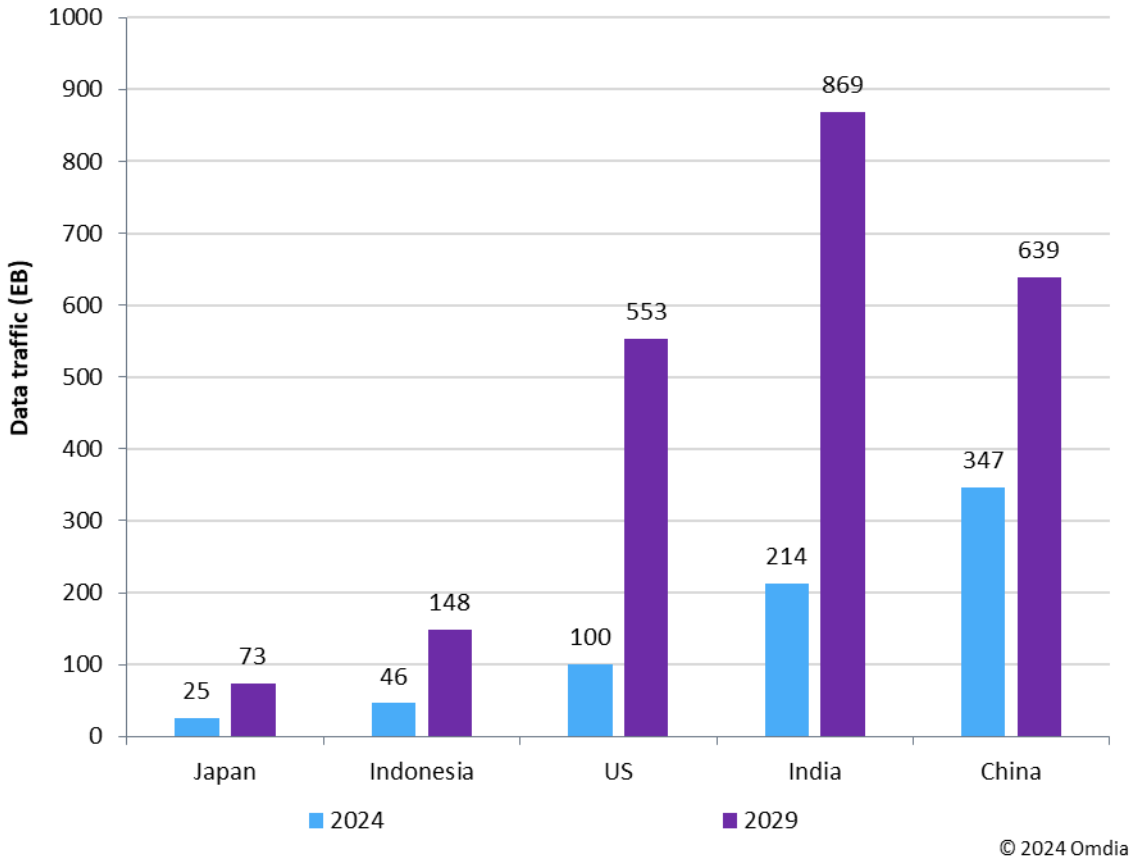
Today, artificial intelligence (AI) is transforming societies and economies, promising improvements in productivity and well-being while also helping to address global challenges, such as climate change, resource scarcity, and health crises. Data plays a critical role in the development, training, and refining of AI systems, enabling them to learn, adapt, and make decisions. Without large amounts of high-quality data, AI systems cannot reason, learn, or make decisions.

Data is also the lifeblood of modern businesses and organizations. It helps them identify threats, opportunities, and problems. Efficient and seamless data exchange is crucial for both business success and individual well-being. To enable this exchange, broadband network connectivity has become a necessity in today's society. Considering its coverage and mobility characteristics, mobile broadband networks are particularly critical for the digitalization of the economy and society.

Therefore, data traffic over communication networks has become a key indicator of an economy's dynamics. Data traffic volume can reflect the size and vitality of an economy, the adoption of digital services and technologies, and the availability of digital infrastructures, among other factors. Additionally, the growth in data traffic growth can be a sign of an economy's development momentum.

Omdia's *Cellular Data Traffic Forecast Report* tracks and forecasts global cellular data traffic volume and growth. The study indicated that the world's super-economies are also the largest traffic-generating markets, significantly outpacing other countries (**Figure 2**). On the other hand, growing data traffic steadily can stimulate investment in digital infrastructures and attract participants to digital service ecosystems, boosting the development of the digital economy.

Figure 1: Largest traffic-generating markets, 2024 vs 2029



Source: Omdia

However, Omdia's study also revealed that the annual growth rate of global cellular data traffic has been decreasing consistently: from 32.5% in 2021 to 22.9% in 2022, and further down to 20% in 2023. To some extent, this ongoing slowdown in traffic growth is a natural result of the maturing mobile internet ecosystem in developed markets. However, it is also a sign of uneven development on both the demand and supply sides of digital economies.

Weak demand—such as low smartphone penetration and an immature mobile app ecosystem—or inadequate network infrastructures can suppress data traffic growth and limit the full potential of digital economies. To address these challenges, the industry and relevant government authorities must join forces to take specific measures aimed at improving the market environment, regulatory policies, or infrastructures based on the unique circumstances of each country.

The first step to improvement is understanding the traffic development status. Both demand and supply factors can shape a country's data traffic development. Analyzing these factors together can provide a holistic view of data traffic development, enabling the industry and authorities to understand traffic development comprehensively. With this understanding, a guide of solutions can be developed to boost cellular data traffic growth, assisting both authorities and industry players in making informed decisions regarding strategies and policies.

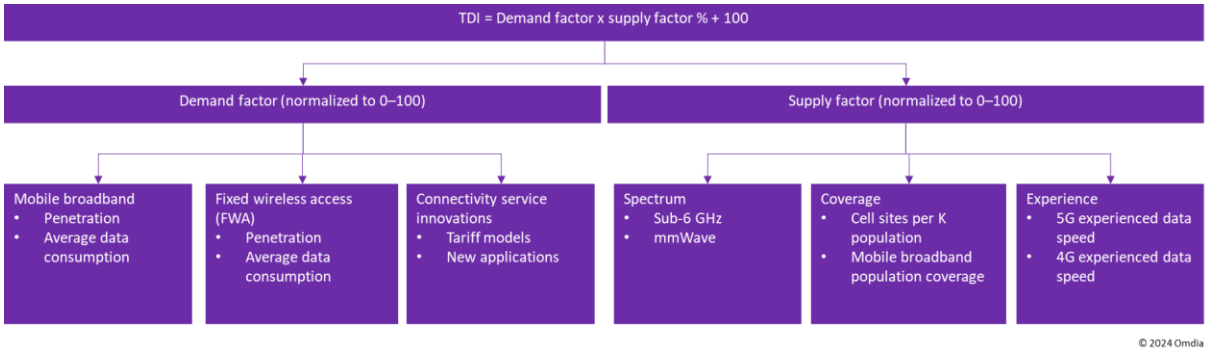
Therefore, Omdia collaborated with Huawei to define the TDI, which serves as a “meter” to benchmark and rank the data traffic development of various countries. This index can be a valuable tool for a country’s industry and authorities to evaluate the current state of data traffic and guide future development in this area.

TDI measures a country's data traffic development

Modeling traffic development from both the demand and supply sides

The TDI has been developed as an index to indicate a country's relative position among benchmarked countries. The layered model evaluates the country's cellular data traffic development from both the demand and supply sides.

Figure 2: TDI



Source: Omdia

On the demand side, the study covers aspects of mobile broadband, fixed wireless access (FWA), and service innovation. On the supply side, key aspects, including spectrum, coverage, and experience, are analyzed.

For each metric, sub-metric data points are collected from Omdia databases, public sources, and contributions from partners. A normalized scoring is performed among all studied countries for each sub-metric. For example, the country with the best data point is scored at 100, and other countries are scored according to their relative value to the best country's data. After this scoring, a weighted average score is calculated for each metric, ultimately leading to scores for both demand and supply factors.

Table 1 and **Table 2** show the metrics and sub-metrics of demand and supply factors.

Table 1: Demand factor metrics

Metric	Sub-metric	Source
Mobile broadband (80%)	User penetration (40%)	Omdia database and public sources
	Average data consumption (60%)	
FWA (10%)	User penetration (40%)	
	Average data consumption (60%)	
Connectivity service innovation (10%)	Percentage of speed-tiered 5G tariff plans to total 5G tariff plans (50%)	
	Percentage of 5G tariff plans bundling 5G-enabled contents to total 5G tariff plans (50%)	

Source: Omdia

Table 2: Supply factor metrics

Metric	Sub-metric	Source
Spectrum (33%)	Sub-6GHz spectrum holding (90%)	Omdia database and public sources
	mmWave spectrum holding (10%)	
Coverage (33%)	Cell site number per thousand capita (50%)	Omdia estimation, public sources, and partner contributions
	Percentage of population covered by mobile broadband networks (4G or 5G) (50%)	
Experience (33%)	Average 5G experience data speed (50%)	Partner contributions and public sources
	Average 4G experience data speed (50%)	

Source: Omdia

The TDI can benchmark mobile data traffic developments across different countries. The benchmarking results can help a country's authorities understand the country's relative position in the global and regional markets and establish industry development goals, considering the benchmark with countries at similar economic and social development stages. Additionally, this benchmark enables industry players to understand each country's relative position and development stage in the global market, aiding them in making informed decisions about investment priorities in both global and regional contexts.

The TDI also evaluates the gap between data traffic growth demand and infrastructure supply of each country. The results of this evaluation can help a country's authorities understand the factors that drive or hinder data traffic growth, enabling them to establish relevant industry policies. These policies aim to maintain a relative balance between traffic demand and infrastructure supply to support the mobile data market's healthy growth.

Additionally, the evaluation can also enable industry players to identify opportunities and challenges related to mobile data traffic development in a country, helping them to decide the relevant marketing and technology strategies. For example, if the demand score is low, operators must explore new services or business models, such as fixed wireless access (FWA) or experience-based tariff models, to stimulate traffic growth. If the supply score is low, authorities could implement proactive policies, such as allocating more spectrum, to boost the infrastructure supply.

Benchmarking 54 countries and territories

We have studied and benchmarked 54 countries and territories from the Americas, Asia & Oceania, Europe, and Middle East & Africa.

Table 3: Countries or territories studied and ranked

Americas (8)	**Asia & Oceania (12)**
Argentina	Bangladesh
Bolivia	Cambodia
Brazil	China
Chile	Hong Kong
Guatemala	Indonesia
Mexico	Kazakhstan
Peru	Malaysia
US	Pakistan
	Philippines
	South Korea
	Thailand
	Uzbekistan
Europe (13)	**Middle East & Africa (21)**
Austria	Algeria
Bulgaria	Bahrain
Czech Republic	Côte d'Ivoire
Finland	Democratic Republic of the Congo
France	Egypt
Germany	Ethiopia
Italy	Ghana
Netherlands	Iraq
Poland	Kenya
Portugal	Kuwait
Romania	Libya
Spain	Morocco
Switzerland	Nigeria
	Oman
	Saudi Arabia
	Senegal
	Somalia
	South Africa
	Turkey
	UAE
	Uganda

Source: Omdia

Figure 4 shows the TDI ranking of the 54 countries and territories. According to their TDI scores, the 54 countries and territories can be categorized into four groups.

Figure 4: TDI ranking and categorization

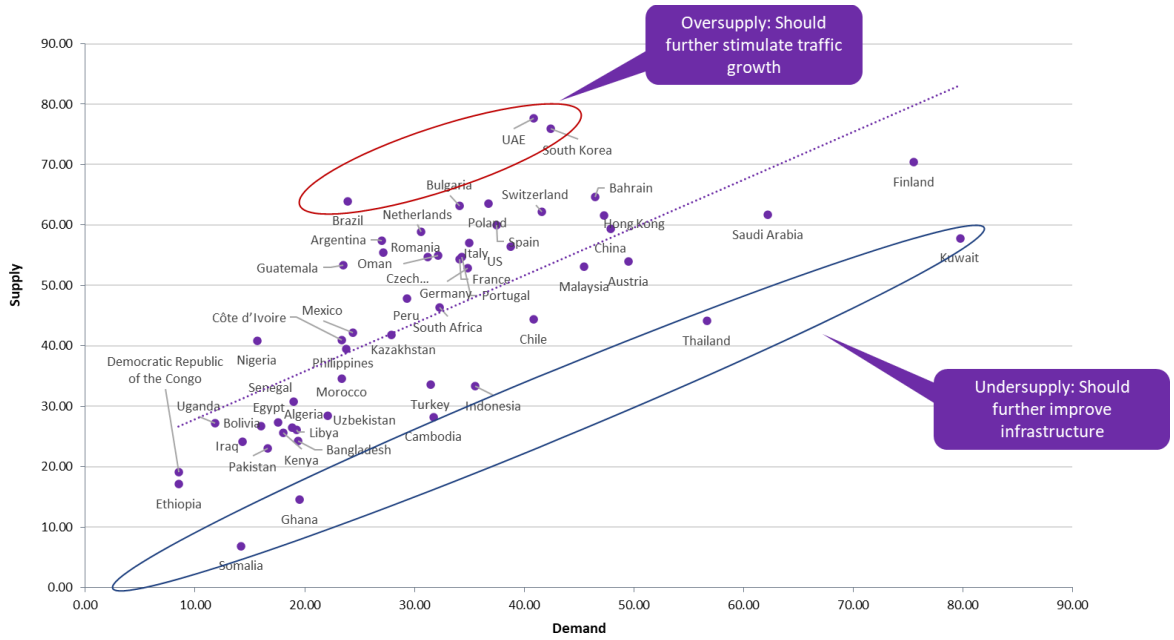
Group	Country	TDI score	TDI demand	TDI supply
Leaders: The countries and territories lead the data traffic development on both the demand and supply sides. Innovative business models and services are necessary to boost data traffic development further.	Finland	153.16	75.50	70.42
	Kuwait	146.09	79.75	57.80
	Saudi Arabia	138.39	62.23	61.69
	South Korea	132.22	42.39	76.00
	UAE	131.76	40.88	77.70
	Bahrain	130.03	46.48	64.62
	Hong Kong,	129.11	47.26	61.59
	China	128.45	47.89	59.41
Maturers: In these countries, the demand and supply of data traffic are generally balanced, therefore they perform well in the ranking. The industry and authorities need to extend network infrastructure and application ecosystems continuously to promote digital economies.	Austria	126.68	49.50	53.91
	Switzerland	125.88	41.64	62.14
	Thailand	124.99	56.69	44.09
	Malaysia	124.13	45.47	53.08
	Poland	123.35	36.72	63.60
	Spain	122.48	37.48	59.96
	US	121.91	38.81	56.46
	Bulgaria	121.53	34.10	63.14
	Italy	119.96	34.98	57.05
	Portugal	118.78	34.32	54.70
	France	118.53	34.11	54.32
	Germany	118.40	34.84	52.82
	Chile	118.15	40.89	44.39
	Netherlands	118.01	30.60	58.85
	Czech Republic	117.67	32.13	54.98
	Romania	117.07	31.19	54.74
	Argentina	115.52	27.01	57.45
	Brazil	115.28	23.90	63.93
	Oman	115.04	27.15	55.41
Accelerators: The countries are behind leading countries on the demand, supply, or both. Policies and investments should be made to promote advanced network technologies and foster local application ecosystem.	South Africa	114.97	32.29	46.37
	Peru	114.03	29.34	47.82
	Guatemala	112.55	23.53	53.33
	Indonesia	111.86	35.55	33.37
	Kazakhstan	111.66	27.87	41.83
	Turkey	110.58	31.50	33.59
	Mexico	110.29	24.40	42.16
	Côte d'Ivoire	109.57	23.37	40.95
	Philippines	109.37	23.76	39.44
	Cambodia	108.96	31.74	28.24
	Morocco	108.09	23.37	34.62
	Nigeria	106.39	15.65	40.87
	Uzbekistan	106.29	22.09	28.45
	Senegal	105.84	19.01	30.71
	Libya	105.02	19.24	26.08
Followers: The digital infrastructure supply in these countries usually cannot meet the market demand. The first step to promote data traffic development in these countries is to improve network infrastructures.	Algeria	104.99	18.83	26.51
	Egypt	104.81	17.60	27.33
	Bangladesh	104.70	19.42	24.22
	Kenya	104.63	18.07	25.65
	Bolivia	104.27	16.02	26.65
	Pakistan	103.82	16.63	22.99
	Iraq	103.45	14.31	24.08
	Uganda	103.20	11.80	27.16
	Ghana	102.84	19.55	14.55
	Democratic Republic of the Congo	101.62	8.48	19.12
	Ethiopia	101.46	8.54	17.08
	Somalia	100.97	14.17	6.84

Source: Omdia

Demand and supply gap analysis guides future traffic development

Through linear fitting, a trend line of demand versus supply can be obtained (**Figure 5**). If a country or territory falls significantly above or below this trend line, it indicates an imbalance between the demand for and supply of data traffic in the country or territory.

Figure 5: TDI's demand vs. supply



Source: Omdia

Figure 5 shows that three countries—UAE, South Korea, and Brazil—are notably above the balance line. This suggests that the supply of infrastructure exceeds the demand for traffic in these countries. We can categorize the countries into two groups based on their 5G network deployment status.

South Korea and UAE are the pioneers in the global commercial deployment of 5G technology. Additionally, their excellent fixed broadband networks (the UAE is also a frontrunner in 5G FWA deployments) offload cellular data traffic to some extent. As a result, the current cellular infrastructure supply exceeds the demand for mobile data traffic.

This excellent infrastructure enables operators in both countries to develop new applications, such as extended reality (XR) and glass-free 3D video, as well as innovative tariff models like on-demand experience boosts. These new applications and tariff models should stimulate traffic growth and help operators achieve a demand-supply balance.

Brazil launched its 5G commercial services later than the leading countries. As a result, Brazilian operators still have work to do to foster a rich 5G ecosystem, which means that the potential for mobile traffic growth has not yet been fully realized. However, as the 5G ecosystem matures, data traffic demands should grow fast. Additionally, Brazil leads in spectrum availability, providing

telecom operators with great opportunities to develop new applications and tariff models. These could further boost traffic demand and support the business growth of Brazilian operators.

Four countries—Kuwait, Thailand, Ghana, and Somalia—are significantly below the balance line, indicating that their infrastructure supply is insufficient to meet traffic demand. However, the traffic development situations in these four countries are quite different. Kuwait and Thailand already have excellent 5G coverage. However, they have less available spectrum compared with countries with leading supply scores. Therefore, to enhance spectrum availability in Kuwait and Thailand, additional spectrum allocation, particularly in the sub-6GHz band, could effectively improve network capacity, user experience, and overall traffic growth.

On the other hand, Ghana and Somalia lag significantly behind leading countries in terms of traffic demand and infrastructure supply. To address this, operators, vendors, and authorities must join forces to accelerate network rollouts and stimulate digital demand. The first step should be to expand mobile broadband network coverage to narrow the gap between demand and supply.

TDI case studies

The TDI benchmark can help a country's industry and authorities understand its data traffic development status and decide on strategies and policies to promote the country's data traffic development. In this analysis, we will examine the cases of four countries to illustrate how the TDI can do so.

Finland: Leading traffic development in the global market

Finland gains the top TDI score among the 54 benchmarked countries and territories. **Table 4** shows Finland's breakdown of TDI scores.

Table 4: Finland's TDI score breakdown

TDI	Score	Rank in TDI
	153.16	1/54
Demand	75.50	2/54
MBB score	79.64	2/54
FWA score	25.29	14/54
Innovation score	92.59	5/54
Supply	70.42	3/54
Spectrum score	70.92	16/54
Coverage score	89.51	2/54
Experience score	50.83	9/54

Source: Omdia

Finland has been a leader in the mobile broadband market since the emergence of 4G technology. Today, it ranks among the top countries globally for mobile broadband penetration, average data consumption, and mobile broadband network coverage. Service providers in Finland are pioneers in exploring innovative business models. Since the 4G era, they have offered experience-based unlimited tariff plans, which have stabilized ARPU and increased data consumption. These factors contribute to Finland's top rankings in mobile broadband, service innovation, and network coverage.

Finland has relatively low scores in FWA and user experience. Despite having excellent fixed broadband penetration, FWA adoption is lower in Finland compared with many other countries. Although Finland is one of the pioneer countries for 5G deployment, the unlimited speed-tiered tariff model encourages consumers to use more data, resulting in high network utilization and comparatively low speeds for the 5G experience.

Service providers in Finland should continue improving their network infrastructures using 5G-Advanced (5G-A). The new technology will increase peak data rates and improve network capacity, futureproofing customer experiences and enabling new services. 5G-A's enhanced performance and capacity will also allow service providers to expand their FWA offers to more residents and enterprises, providing an alternative solution to broadband customers.

Meanwhile, more efforts should be made to develop innovative applications. For example, AI-powered applications and digital tools can be leveraged to enhance personalized customer experiences and create new monetization opportunities.

Saudi Arabia: A balanced demand and supply results in a strong TDI ranking

Saudi Arabia is ranked number 3 among the 54 benchmarked countries and territories. **Table 5** shows Saudi Arabia's breakdown of TDI scores.

Table 5: Saudi Arabia's TDI score breakdown

TDI	Score	Rank in TDI
	138.39	3/54
Demand	62.23	3/54
MBB score	68.80	3/54
FWA score	62.67	1/54
Innovation score	9.26	30/54
Supply	61.69	9/54
Spectrum score	75.51	10/54 (tie)
Coverage score	61.05	11/54
Experience score	48.50	13/54

Source: Omdia

Saudi Arabia is the world's ninth-largest 5G mobile market and the largest in the Middle East. Omdia forecasts that 5G will become the dominant technology in the country in 2024, with a share of 47.2%. According to the Communications, Space, and Technology Commission (CST), the average monthly data consumption per person (mobile) reached 44GB in 2023. Both metrics indicate a strong data traffic demand and push the TDI demand score high.

The regulator in Saudi Arabia has followed a policy of proactive spectrum re-allocation from incumbent users (e.g., terrestrial TV and amateur radio) to mobile, providing sufficient spectrum in sub-6GHz bands and gaining a good ranking in the TDI supply factor.

On the other hand, Saudi Arabia's innovation score is relatively low, indicating that only a few service providers in the country offer experience-based tariff models or bundle 5G-enabled content. If service providers in the country can strengthen their innovations on tariff models and content applications, data traffic growth can be further stimulated, helping the service providers create new monetization opportunities.

Meanwhile, service providers in Saudi Arabia can continue extending their mobile broadband coverage and improving user experience, further boosting data traffic growth.

Thailand: The country's lack of available spectrum is hindering its TDI ranking

Thailand is ranked number 11 among the 54 benchmarked countries and territories. In contrast to countries like Finland and Saudi Arabia, which have a balanced traffic demand and infrastructure supply, Thailand exhibits a significant imbalance between demand and supply. **Table 6** provides a breakdown of Thailand's TDI scores.

Table 6: Thailand's TDI score breakdown

TDI	Score	Rank in TDI
	124.99	11/54
Demand	56.69	4/54
MBB score	55.59	4/54
FWA score	24.03	15/54
Innovation score	98.15	2/54 (tie)
Supply	44.05	30/54
Spectrum score	43.17	31/54
Coverage score	67.92	9/54
Experience score	21.19	37/54

Source: Omdia

Thailand is a leading country in mobile broadband development and is known for its extensive coverage and innovative service models. Service providers in the country have been actively expanding their 5G network coverage. AIS, one of the major providers, reported over 87% nationwide population coverage, supported by more than 26,000 base stations.

To improve user experience and boost traffic growth, these service providers are also developing experience-based tariff models. For example, AIS has launched the Living Network, offering uplink prioritization, lower latency, and speed boosts. All these effectively boost data consumption and traffic growth in Thailand, leading to high scores for network coverage, mobile broadband, and service innovation.

However, the lack of sub-6GHz spectrum limits network capacity and user experience, which in turn lowers Thailand's TDI supply scores and impacts its overall TDI ranking. This lack of spectrum also limits the potential for developing new services. For example, FWA services often require significant spectrum to provide competitive data speeds comparable to fixed broadband networks. Additionally, experience-based tariff models rely on sufficient network capacity. Providing a differentiated user experience in an overloaded network is almost impossible. Securing sufficient spectrum is the must-have foundation to increase network capacity and enable experience-based business models.

Therefore, Thailand requires more spectrum to balance the traffic demand and infrastructure supply and improve its TDI ranking. It is encouraging to note that the National Broadcasting and Telecommunications Commission (NBTC), Thailand's regulatory authority, has established a roadmap for the allocation of new spectrum, specifically in the 3.5GHz and upper 6GHz bands. With

the additional spectrums, Thailand's mobile broadband infrastructure will be further improved, boosting the country's traffic development.

Netherlands: Further measures required to stimulate traffic demand

The Netherlands is ranked number 22 among the 54 benchmarked countries and territories. Unlike the leading countries analyzed above, the Netherlands is a typical midrange country in the TDI ranking. **Table 7** provides a breakdown of the Netherlands' TDI scores.

Table 7: The Netherlands' TDI score breakdown

TDI	Score	Rank in TDI
	118.01	22/54
Demand	30.60	28/54
MBB score	32.47	26/54
FWA score	11.06	37/54
Innovation score	35.19	19/54 (tie)
Supply	58.85	13/54
Spectrum score	75.24	13/54
Coverage score	56.94	19/54
Experience score	44.36	16/54

Source: Omdia

The Netherlands has been leading the adoption and innovation of mobile technology. The country has a high penetration of mobile broadband penetration, and it is advancing its 5G network, while its existing 4G networks still provide an excellent user experience. Service providers in the Netherlands have begun offering experience-based tariff plans and bundling 5G-enabled content, which stimulates data consumption and fosters new service opportunities. As a result, the Netherlands scores relatively high in areas such as spectrum availability, coverage, user experience, and service innovation.

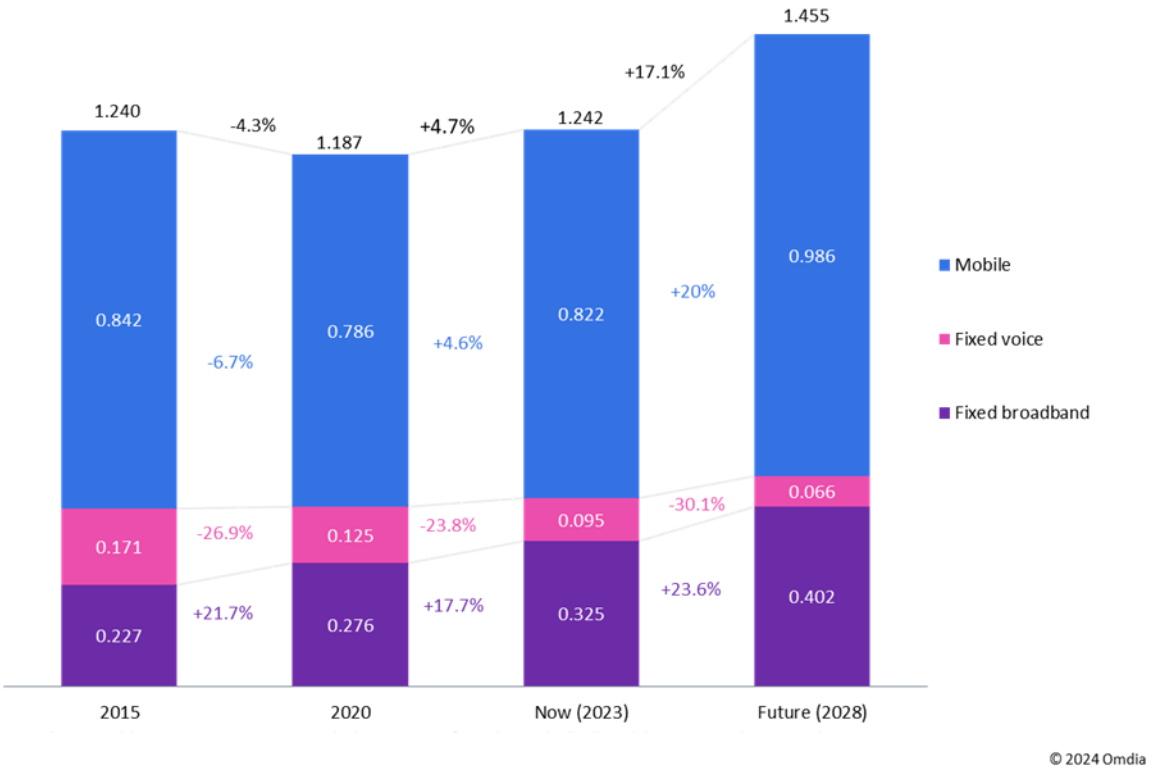
The Netherlands' demand factors are relatively weak compared to its supply scores. Like other developed countries with excellent fixed broadband networks, the Netherlands' demand for FWA services is quite low. Meanwhile, service providers in the Netherlands are facing another serious challenge: Dutch consumers tend to use less data than their Western European neighbors, such as France or Germany. This low data consumption limits the monetization opportunities of the service providers and leads to a relatively low TDI score for the country, as the average data usage holds a significant weight in the TDI model.

Therefore, measures must be taken to boost data consumption. Service providers in the country should focus on enhancing their service innovations by promoting 5G-enabled content and leveraging AI applications to stimulate data usage. The recent auction of the 3.5GHz spectrum will accelerate 5G deployments in the Netherlands. With improved 5G capacity and user experience, we expect to see significant growth in data traffic.

Traffic development outlook

The global telecoms industry is experiencing a return to growth. According to Omdia, total telecoms connectivity revenue reached $1.24tn in 2023, which is 1.3% higher than in 2022 and 4.7% higher than in 2020, based on a variable currency conversion rate. This revenue is at the same level as it was in 2015. The market demand will remain strong. Connectivity revenue should grow by 17.1% over the next five years, with mobile revenue should increase by 20% and fixed broadband revenue by 23.6%.

Figure 6: Total connectivity revenue ($tn)



Notes: Based on a variable currency conversion rate applied as an average for each period. All collected data is captured in the reported currency

Source: Omdia World Information Series — Service Provider

Strong demand will drive continuous growth in data traffic. Omdia expects that cellular data traffic will increase more than threefold over the next five years. This will be helped by faster 5G migration, with the penetration rate reaching 57% globally by 2029 for a combined total of 5G mobile and FWA. The expansion of 5G networks can offer a significant boost to data traffic. The availability of

affordable 5G-enabled devices, online gaming, 4K videos, virtual reality (VR), and augmented reality (AR)—all of which are high-bandwidth services—will place unprecedented traffic demand on 4G and 5G networks. Therefore, Omdia predicts that the global average data traffic per month will more than double from 2024 to 2029.

China, India, and the United States will be the world's top three largest traffic-generating markets from 2024 to 2029, thanks to their large populations. In China and the US, High 5G smartphone penetration and 5G-rich apps, such as 4K video, cloud gaming, and augmented reality (AR), are boosting data usage. Meanwhile, in India, low-cost tariffs, affordable smartphones, and the expansion of network coverage will drive traffic growth in India.

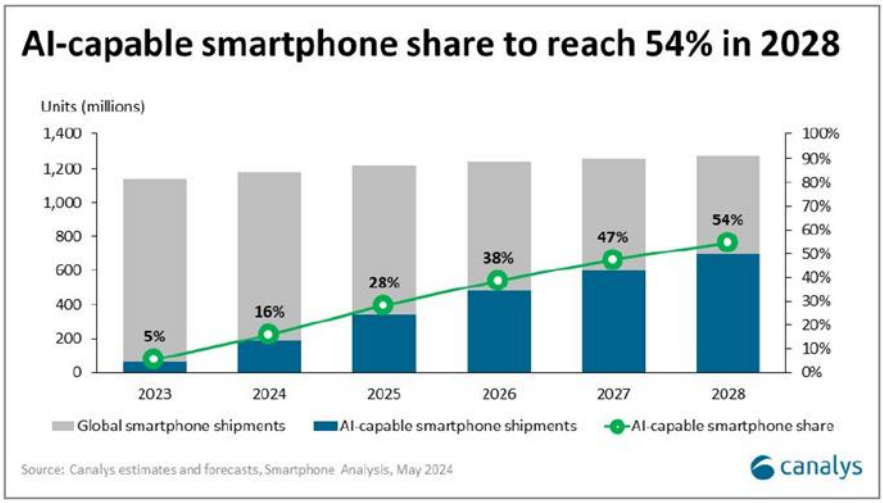
By 2029, Finland will be the top market in average data traffic, reaching 95GB monthly. This is driven by its extensive 4G and 5G networks, extremely competitive and comprehensive mobile data plans, near-universal high-speed coverage, and affordable pricing. Following Finland, Saudi Arabia is projected to have significant average data consumption, driven by the expansion of 5G networks and innovations in AI technologies that enhance user experiences on 5G.

With the rollouts of 5G-A, mobile service providers can meet consumers' demand for faster speed. According to Omdia's *2024 Digital Consumer Insights survey,* respondents ranked speed – faster speed, premium download speed, and speed boost – as the top three features of 5G for which they are willing to pay more. This presents a great opportunity for service providers to monetize 5G-A, which offers faster data speeds than current 5G, through experience-based tariff models.

Experience-based tariffs should expand significantly in 2025, moving beyond the early adopters. More service providers will adopt not only downlink speed tiers but also uplink speed tiers and speed boosts tailored for niche audiences, such as concertgoers. This will help service providers to monetize their advanced networks and stimulate data traffic growth.

The launch of AI-capable smartphones indicated that these new AI features have the potential to transform the smartphone market and trigger a new wave of device replacements. Canalys forecasts that more than half of smartphone shipments in 2028 will be of AI-capable smartphones (**Figure 7**).

Figure 7: AI-capable smartphone forecast



Source: Canalys

AI features, particularly those found in generative AI (GenAI) applications, often require significant computing power that exceeds the capabilities of on-device computing and can consume excessive amounts of power. Therefore, mobile broadband connectivity will be necessary to enable local and cloud hybrid computing for AI applications.

The multimodal large language model (LLM), first introduced by OpenAI in May 2024, supports vision input, enabling users to use their smartphone cameras to capture videos or images and receive instant responses from AI agents. The move from text-based to image-based input should create more impact on mobile traffic. This will expand further as vision AI capabilities are more accessible across devices and many new use cases emerge.

AI technologies can also be used to perform accurate customer segmentation, propose the most suitable tariff plans, and convert popular 2D content into affordable 3D content. All these will enhance user experience and boost traffic growth.

On the supply side, 5G SA architecture is going mainstream. According to Omdia's *Service Providers Core Networks Survey – 2024*, about 58% of respondents have already launched or expected to launch 5G SA by the end of 2024. Over 90% of respondents anticipate at least an initial deployment of 5G SA by the end of 2026. The 5G SA architecture supports end-to-end network slicing, which allows service providers to meet various quality of service (QoS) requirements from diverse applications and to create new monetization opportunities.

Meanwhile, service providers are extending their 5G rollouts in mid-bands, such as the 2.6 or 3.5GHz bands, to meet the growing demand for enhanced network performance and capacity. For example, all major mobile operators in the Netherlands auctioned off 3.5GHz 5G spectrums in June 2024, targeting to complete the rollouts and cover approximately 60% of the country by 2026. Similarly, Deutsche Telekom plans to increase its 3.xGHz rollouts in Germany and other European markets by 1.3 and 3x, respectively, from 2023 to 2027. The mid-band spectrum enables mobile operators to deploy 5G networks with a carrier bandwidth of 100 MHz, allowing them to realize the full performance potential of 5G and provide a better user experience compared with 5G networks operating in lower frequency bands.

The 5G radio access network in mid-bands and 5G SA core together empower service providers with true 5G capabilities, ensuring an excellent user experience while allowing them to monetize their networks. 5G-A, currently available in a few markets, will further improve performance and capacity to meet future demand.

In summary, telecom services have been and will continue to be resilient. Strong market demand will lead to steady growth in data traffic. Experience-based tariff models and AI applications will create new opportunities for service providers to monetize their mobile broadband networks, serving as new boosters for data traffic growth. True 5G networks, with 5G radio in mid-bands and a 5G SA core, will enable service providers to support growing traffic demand and provide differentiated services.

Appendix

Methodology

The TDI model is based on Omdia databases (as shown below), public sources from regulators, service providers, etc., and the input from the partner, Huawei.

- World Cellular Information Series (WCIS)
- World Broadband Information Series (WBIS)
- 5G Consumer Broadband Pricing Tracker
- Cellular Data Traffic Forecast
- Spectrum Holdings and License Auctions

The TDI model is summarized in the following table:

Table 8: Summary of the TDI model

TDI	Demand factors x Supply factors% + 100											
L1 metric	Demand factors (normalized to 0-100)						Supply factors (normalized to 0-100)					
L2 metric	Mobile broadband		FWA		Service innovation		Spectrum for cellular mobile		Network coverage		User experience	
L2 weighting factor	90%		10%		10%		33%		33%		33%	
L3 metric	Mobile broadband penetration	Average data consumption	FWA penetration	Average data consumption	Adoption of speed-tiered tariffs	Adoption of 5G-enabled content	Sub-6GHz spectrum	mmWave spectrum	#BS/K population	Mobile broadband network coverage	Average 5G speed	Average 4G speed
L3 weighting factor	40%	60%	40%	60%	50%	50%	90%	10%	50%	50%	50%	50%

Source: Omdia

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