TELECOMMUNICATIONS PERFORMANCE INDICATORS 2023

Curaçao ICT sector Benchmarking & Analysis

STATISTICAL
PUBLICATION
END OF YEAR 2022

BUREAU TELECOMMUNICATIE EN POST
MULTI-SECTOR REGULATORY AUTHORITY

DISCLAIMER

The information and statistics in this report are derived from a variety of sources but are mainly based on data obtained from the local telecommunication service providers. In case of incomplete or untrusted information, estimates are used based on careful analysis of existing data, extrapolation and market intelligence. In following publications estimates will be replaced with official data when received from service providers and/or other trusted sources. This report does not constitute commercial or other advice. No warranty, representation or undertaking of any kind, express or implied, is given in relation to the information and statistics contained in this report.

Publication date: February 2024

Bureau Telecommunicatie en Post
Beatrixlaan 9, Emmastad
Willemstad, Curacao

www.btnp.org

TABLE OF CONTENTS

1 List of tables and figures

Tables

Figures

2 ABOUT THIS REPORT

This report offers a detailed overview of the local trends in the telephony market (comparing fixed prices and prices for mobile-voice services), broadband internet market (mobile and fixed broadband), subscription television market (pay-tv) and other related Information and Communication Technologies indicators (from here on: ICT-indicators) in Curaçao. This publication is the tenth telecommunications market report by the Bureau Telecommunicatie en Post[1] (from here on: BT&P) and the data is collected through an internationally standardized questionnaire organized by the International Telecommunication Union[2] (from here on: ITU) in combination with questions relevant to the BT&P.

The questionnaire was sent to all local telecom operators in April 2023, requesting information representing 2022, more specifically related to the date of December 31st, 2022 (from here on: End-of-Year, EOY 2022). Most of the data was received by BT&P in the third and fourth quarters of the year 2023 and early 2024. The data collected by BT&P from local telecom operators based on the standardized questionnaire was subsequently submitted to the ITU for benchmarking purposes and to be processed in several international publications. In this report some information is gathered and analyzed separately from the ITU questionnaire data, for example the fixed and mobile telephone subscriptions, mobile broadband information, fixed broadband penetration as a percentage of households (domestic internet), average download speeds, and data centers related information. Most of the benchmarking analysis are conducted on the previous year (EOY 2021) as the information of EOY 2022 from other sources was not readily available at the time of production of this report.

In 2018 the ITU introduced a new diverse price baskets methodology to monitor the all-round development of the telecommunication market. This restructured method has been functional since the price-data collection questionnaires starting in 2019 for the End-of-Year information of 2018. Therefore, the ICT price benchmarks from 2018 and forward are not directly similar then those of the previous years. Since 2020 the BT&P has been using the new method to monitor the telecommunication market.

[1] Multi-sector regulatory authority in Curacao. For more information visit www.btnp.org.
[2] Visit www.itu.int for more information.

To compare the previous method with the current method. The previous method consisted of 3 baskets; fixed telephony basket, mobile cellular basket and the fixed broadband basket. Each sub-basket was calculated separately, and the three results were added together in a predetermined formula. Finally, the average of these baskets was calculated, and the resulted indicator was representative for the whole telecommunication sector and was further used for international benchmarking purposes.

The current Price Basket has been extended to five baskets; fixed-broadband, mobile-voice, mobile-data-only, and mobile-data-and-voice basket including high and low consumption baskets. More attention is being given to internet services as a predominant factor in the telecommunication industry and fixed telephony (tariffs) benchmarking is removed from the ITU benchmarking analysis. For this reason, in this report again, fixed-broadband, mobile-voice and mobile-data are also the main topics that will be analyzed with regards to the ICT Price Basket. The other difference with the current and previous method is, that for the current method each basket is benchmarked separately. Therefore, there is no aggregate result that can benchmark the overall telecommunication sector just by using a single indicator.

Telecommunication authorities worldwide collect the standardized ITU questionnaire data and ICT Price Basket information. Most of the available data is published yearly by the ITU in the 'Yearbook of Statistics'. Specific pricing related information can be found in the "Measuring digital development - ICT-Price Trends" reports by the ITU. Through the ITU World Telecommunication/ICT indicators (WTI) database (2023), the BT&P was able to benchmark the Curaçao data against peers in the Caribbean region, North-, Central-, South- and Central America, including Europe countries and the Asia & Pacific averages and some other specific countries. In this report, the BT&P does not share what is considered to be market sensitive information belonging to telecom operators. In addition, BT&P uses international studies and datasets from recognized bodies like the World Bank database and the Central Bureau of Statistics Curaçao to add interesting market information to this report. This is how BT&P keeps an eye on ICT-trends and developments in the local and international markets and is able to develop fact-based policy.

3 FIXED TELEPHONE NETWORK

3.1 Fixed-telephone subscriptions

The chart below shows the trend regarding fixed-telephone subscriptions in Curaçao over the last fourteen years. In the end of 2022, the number of fixed telephone subscriptions slightly decreased to 50,576 subscriptions, representing an overall drop of 2,519 subscriptions and thus resulting into a 4.7 percent decline from the previous year.

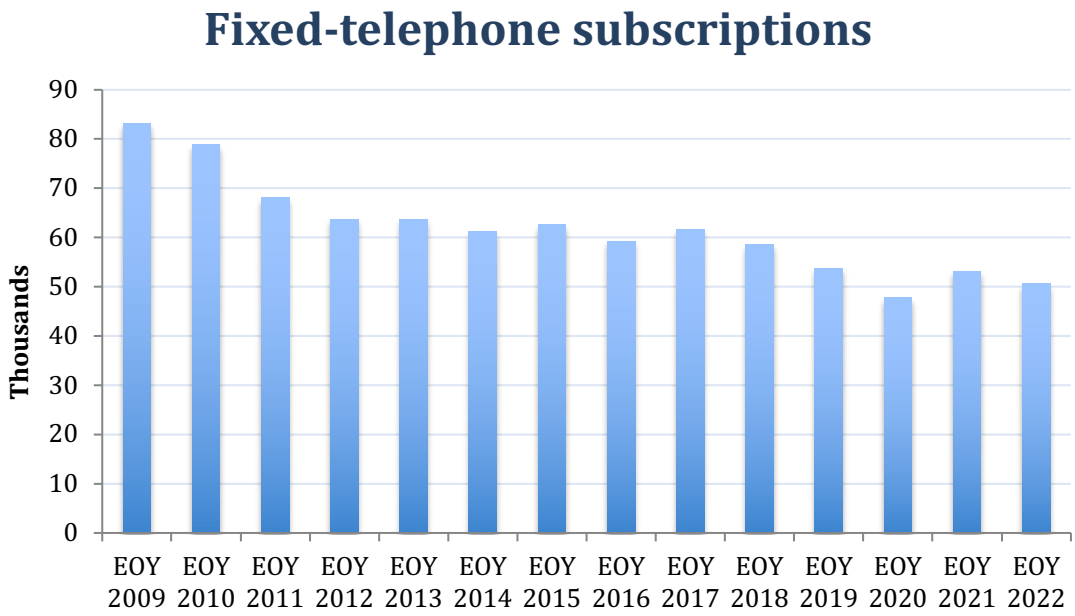


Figure 1: Fixed-telephone subscriptions, EOY 2009 - EOY 2022

The use of fixed telephone lines has changed considerably from 83.0 thousand in 2009 to 50.6 thousand subscriptions at the end of 2022. The proportion of households with fixed telephone access in Curaçao has generally been declining since 2009, but since 2012 the number of fixed telephone subscribers have maintained relatively stable up to the year 2017. From EOY 2017 to 2022 the number of fixed-telephone subscribers fell considerably by more than 10.0 thousand subscriptions.

The total number of fixed-telephone subscribers in Curaçao has declined almost with 40 percent over the last 13-year period. This change has come mostly from subscribers using mobile telephony or alternative apps for making calls via the internet. This is a normal worldwide trend as a consequence of technology advancements and as such the same developments can also be seen in other markets.

3.2 Fixed-telephony per 100 inhabitants

The standard metric recognized internationally to measure the adaption of fixed voice services penetration is calculated based on the number of fixed voice subscriptions per 100 of the population. For benchmarking purposes with go back to EOY 2021. The EOY 2021 fixed voice penetration was calculated at 27.9, which is 2.1 percent lower than the previous year. This means that in 2021 there were approximately 28 fixed voice subscriptions available to every 100 persons in Curaçao. As shown in figure 2, Curaçao scores considerable higher than the rest of the region. See Appendix D1 for list of countries and source data.

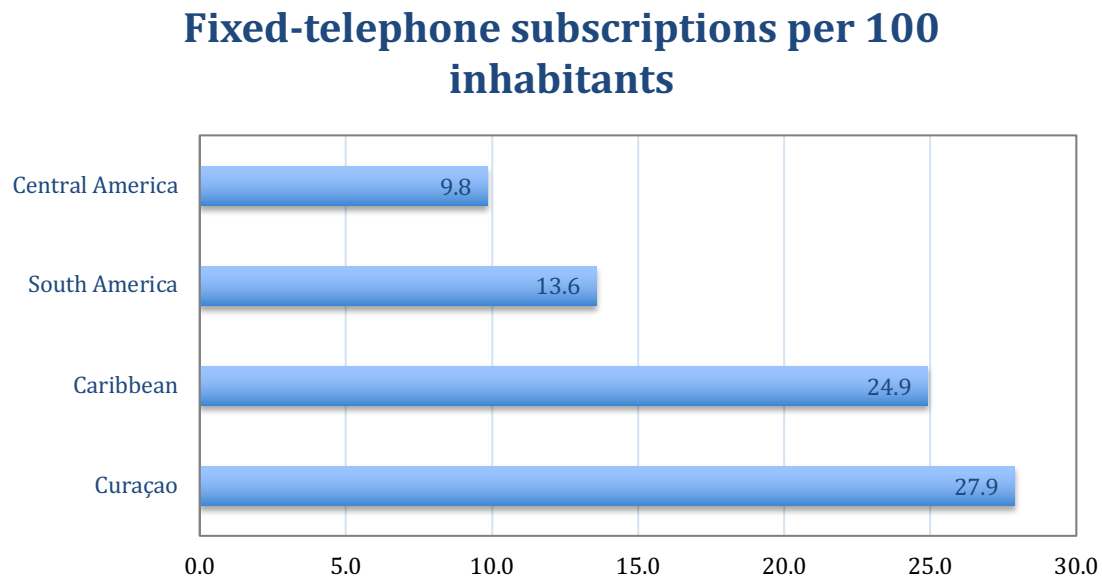


Figure 2: Fixed-telephone subscriptions per 100 inhabitants compared to the region and the world, EOY 2021

3.3 Fixed-telephone tariffs

In previous publications the ITU used the method of USD costs per three-minute call, including any call set-up charges and taxes, for both peak and off-peak calls to benchmark the fixed telephone tariffs. As the fixed-telephone market faced a slowdown stage in the developed markets with no technology advancements, the ITU policy is setting more priorities and focus on the infrastructure and services of fixed and mobile and broadband. Some trends in consumer behavior are being observed recently. Voice calls are being placed more frequently on mobile networks, in clear substitution of fixed networks. The emergence of over-the-top providers (OTT) has enabled the use of a myriad of new services via mobile networks, and some of these services are very similar to those offered by traditional operators. A call can be placed today via any operator network or by using the open Internet with the use of a specific app, bypassing the

traditional business offer of the operator. Therefore, the ITU stopped collecting data on fixed-telephone tariffs since 2018.

The BT&P however has continued collecting this data to monitor the market development and related activities in Curaçao. The table below provides an overview of a one-minute fixed-telephone call during peak hours including set-up fees and 1st minute charges for the period 2012-2022.

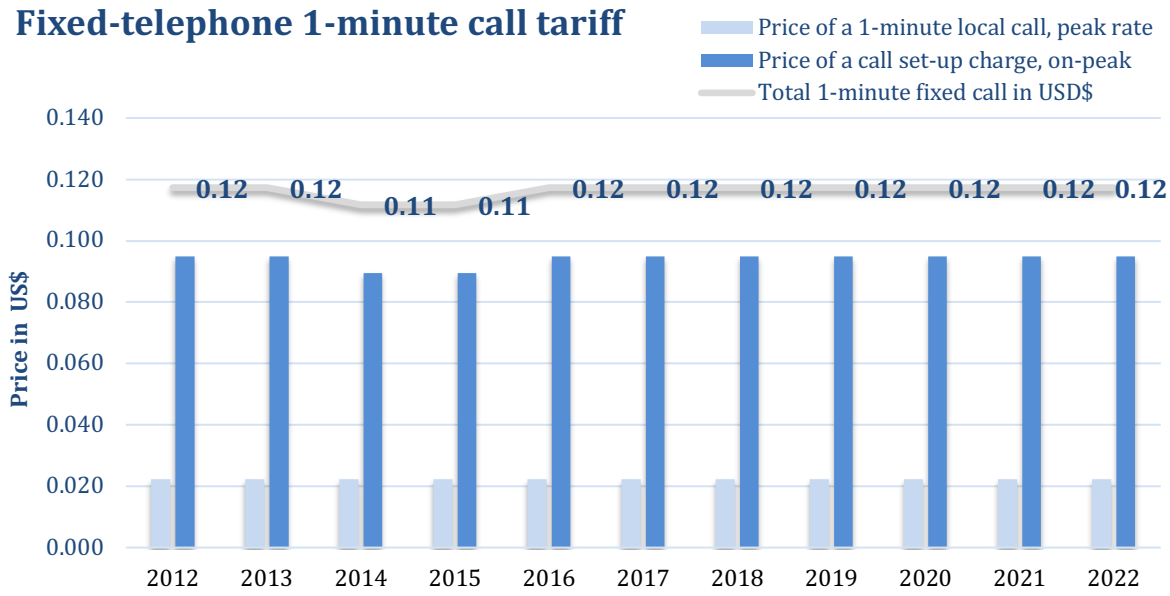


Figure 3: Fixed-telephony tariffs in USD, EOY 2012-2022

The first-minute fixed-telephone call during peak hours for the year 2022 would cost around 0.21 ANG / 0.12 USD including taxes. This is calculated based on information of the largest market share operator which applies a per-minute rate of 0.04 ANG and 0.17 ANG call set-up charge for each fixed local call. This is for the most part consistent with the previous years. Furthermore, the largest market share operator makes no distinction between peak and off-peak prices. The graph shows clearly as stated before the lack of developments with regards to fixed telephony tariffs for the last years.

4 FIXED BROADBAND INTERNET

4.1 Fixed-broadband internet subscriptions

Telecommunication service providers in Curaçao use a mix of technologies to provide fixed broadband internet services to the public. Fixed broadband internet services employ nowadays Hybrid Fiber-Coax (HFC) networks utilizing the latest DOCSIS technology, as well as a mix of Fiber to the Curb (FttC), Fiber to the Business (FttB), or Fiber to the Home (FttH) topologies and terrestrial fixed-wireless broadband.

The market for fixed broadband[3] reached 51.8 thousand subscriptions in the EOY 2022 as shown in figure 4. The presented numbers are based on residential subscriptions (fixed domestic internet) and may include small businesses. Fixed broadband subscriptions contracted by public and private organizations (non-residential customers), are not considered in this analysis. The national fixed (wired) internet penetration level has reached an estimated level of 89.2 percent in EOY 2022 on terms of connected households.

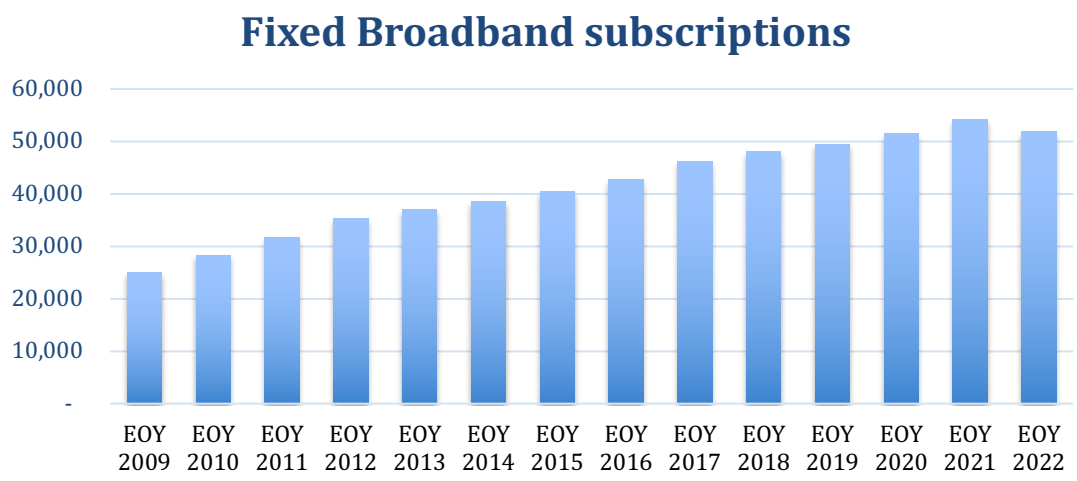


Figure 4: Fixed (wired) broadband subscriptions, EOY 2009 - EOY 2022

[3] Fixed (wired)-broadband subscriptions refer to subscriptions to highspeed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This threshold of speed can be reached with different fixed or wireless 'fixed' technologies: digital subscriber line (DSL), coaxial cable, optical fibre cable (fibre to the home/ premise, FTTx), in-building Ethernet Local Area Networks (LANs) and fixed wireless such as WiMAX and other technologies.

4.2 Fixed broadband subscriptions by speed

Total fixed broadband subscriptions reached a total of 58.7 thousand for the EOY 2022 including enterprise connections. The broadband speeds of 100 Mbit/s or higher represents the largest category in EOY 2022 with 48% of the total connections followed by 38.5% for the category of 30 - 100 Mbit/s (see figure 5 below). The speeds of in between 2 Mbit/s to 10 Mbit/s were represented by 4.3% of the total connections, whereas the speeds of in between 10 - 30 Mbit/s reached 9.2%. The speed group below 2 Mbit/s has diminished in the last few years as the fixed broadband subscriptions for this category are not available anymore since 2017. The lowest available entry-level fixed internet subscription offered by the largest ISP in Curaçao at this moment starts at 100 Mbit/s download speed.

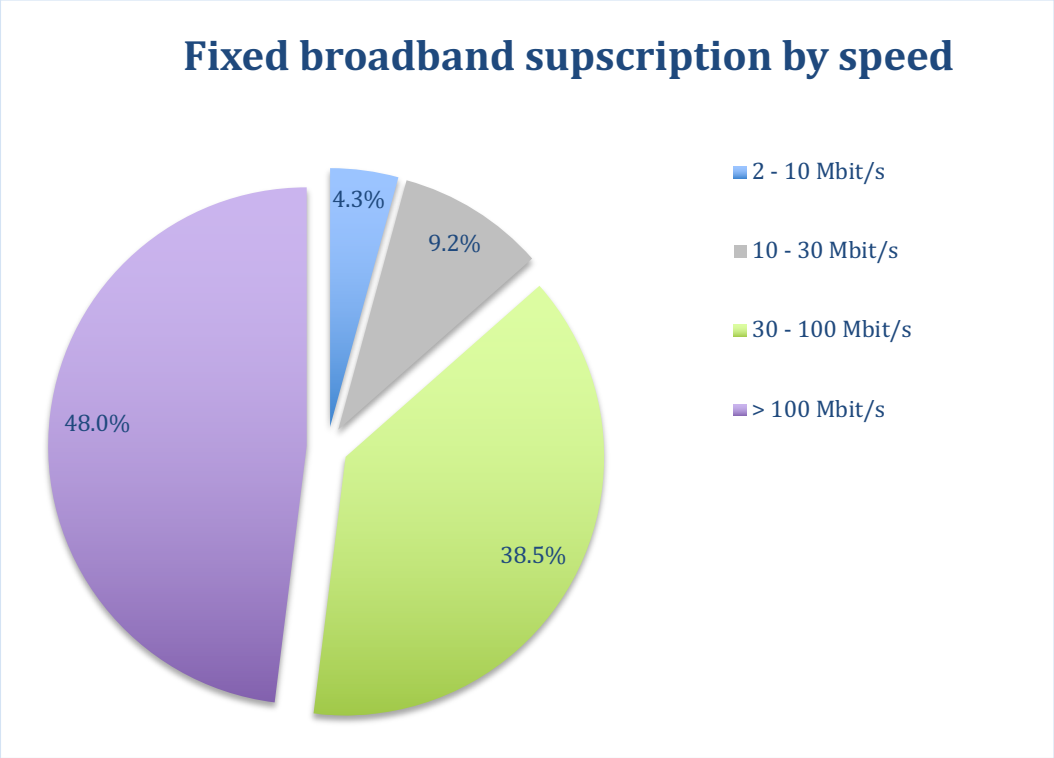
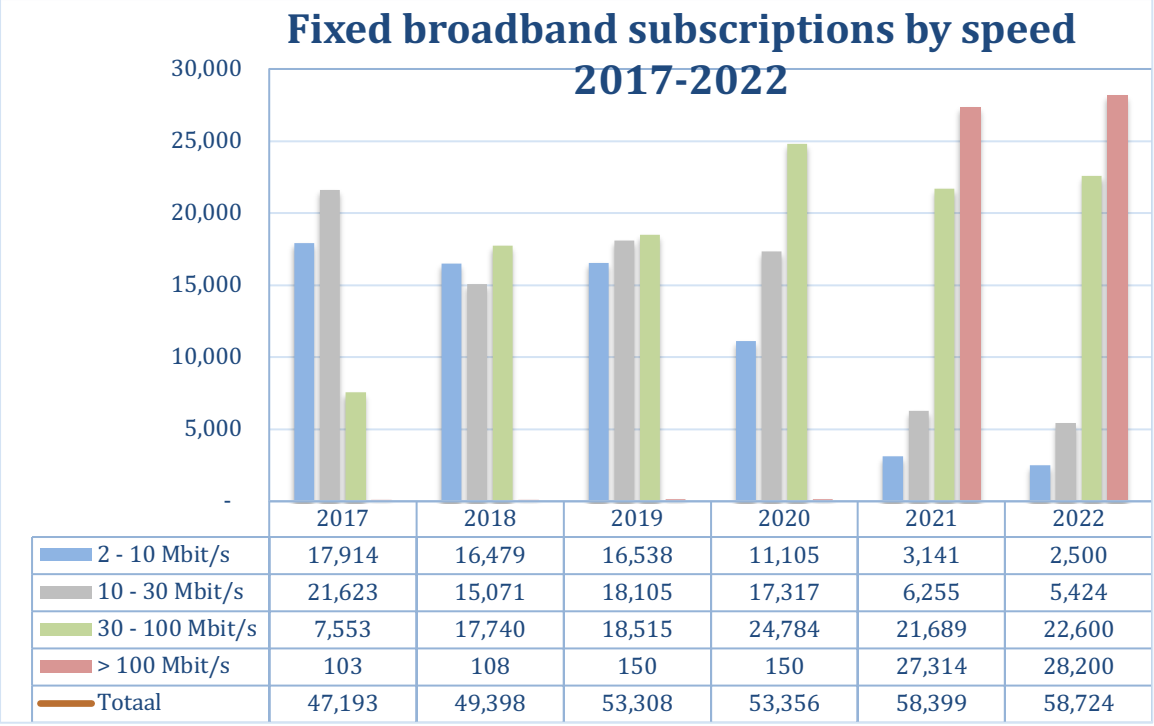


Figure 5: Fixed (wired) broadband subscriptions by speed in percentages, EOY 2022

Figure 6 below shows the development of the fixed broadband subscriptions based on speed categories from 2017 up to 2022. We can clearly see a progress in speeds of higher than 30 Mbit/s up to 100 Mbit/s from 2018 to 2022. There's a clear development and shift in connectivity over the last three years as most of the population has been upgraded by their ISPs to newly offered speeds of 100 Mbit/s.



	2017	2018	2019	2020	2021	2022
2 - 10 Mbit/s	17,914	16,479	16,538	11,105	3,141	2,500
10 - 30 Mbit/s	21,623	15,071	18,105	17,317	6,255	5,424
30 - 100 Mbit/s	7,553	17,740	18,515	24,784	21,689	22,600
> 100 Mbit/s	103	108	150	150	27,314	28,200
Totaal	47,193	49,398	53,308	53,356	58,399	58,724

Figure 6: Fixed (wired) broadband subscriptions by speed, EOY 2017-2022

An international benchmarking based on entry-level fixed-broadband average speeds shows that Curaçao with 100.0 Mbit/s in EOY 2022 is well above the Caribbean region, North-, Central-, and South-America. The average entry-level fixed-broadband speeds is 143 Mbit/s for Europe countries and 114 Mbit/s for Asian Pacific countries. While the United States is big steps ahead in our region with entry-level subscription speeds starting around 200.0 Mbit/s and above, some countries like Singapore, Japan, China (Hong Kong), Iceland and Italy are already making the 1 Gbit/s entry-level mark for fixed broadband internet.

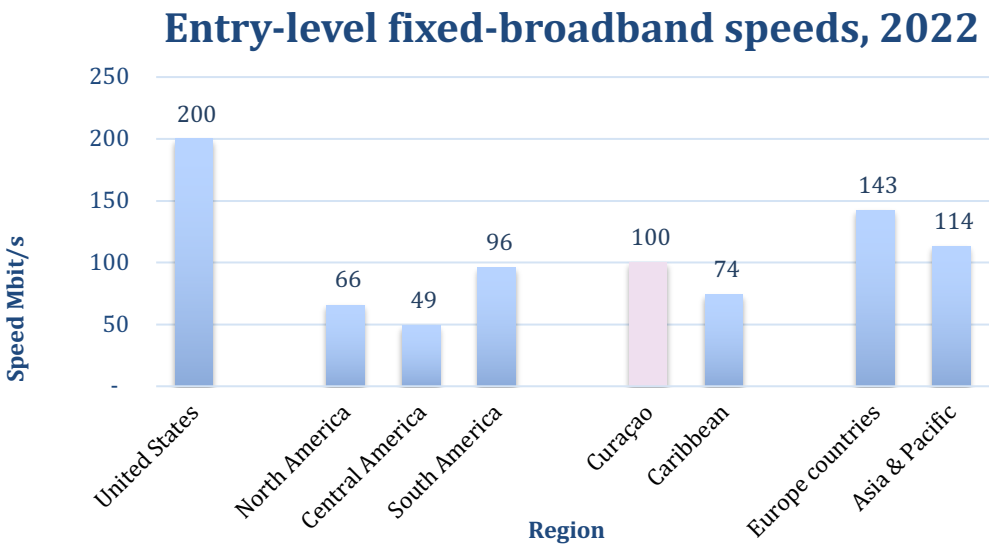


Figure 7: Entry-level fixed-broadband median speeds, EOY 2022

4.3 Fixed-broadband per 100 inhabitants

The term fixed-broadband refers to a high-speed TCP/IP connection to the public Internet at downstream speeds equal to, or greater than, 256 Kbit/s. ITU uses the term (indicator) fixed-broadband subscriptions per 100 inhabitants to measure the number of subscriptions for every 100 inhabitants in a particular region. This represents the penetration of fixed broadband internet in a country in terms of population.

4.3.1 Fixed broadband subscriptions per 100 inhabitants

In December 2021, Curaçao had a fixed broadband penetration of 40.0 in terms of population. This implies that there were approximately 40 fixed (wired) Internet subscriptions for every 100 inhabitants in Curaçao. In comparison with EOY 2020, there is an increase of 5.1% fixed (wired) Internet subscriptions for every 100 inhabitants in Curaçao. This is consistent with the technology advancements, new internet developments after the COVID-19 pandemic, and related available services of the last few years.

If compared to the region as shown in figure 8, Curaçao has a remarkable higher fixed broadband penetration rate than other countries in the Caribbean region. See Appendix D1 for list of countries and source data. This indicator for Curaçao is even higher than to those of developed countries.

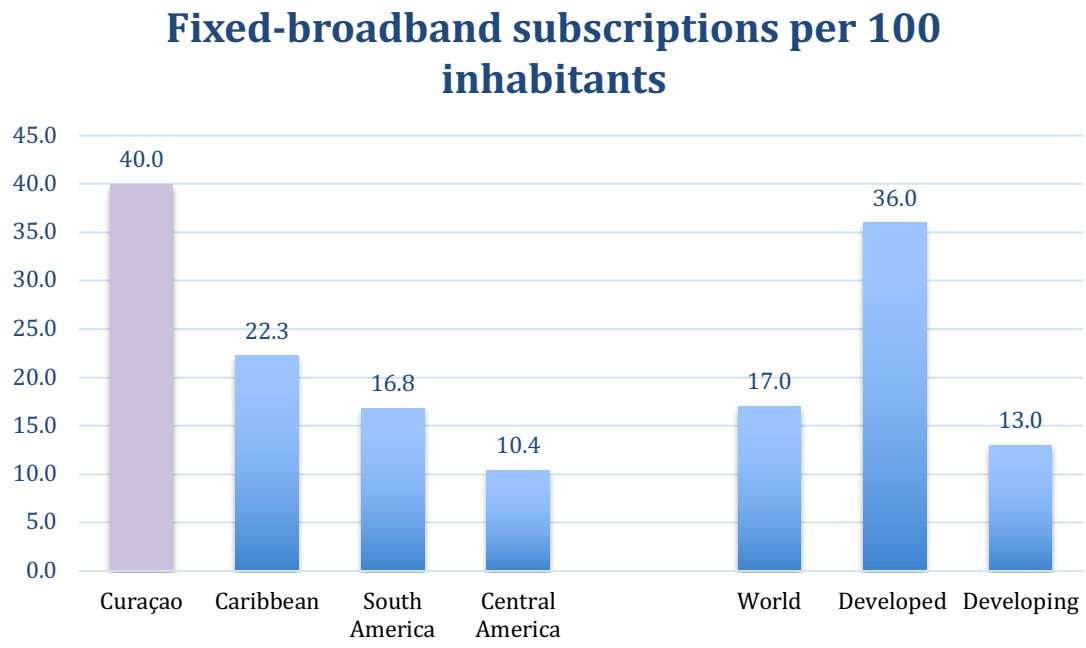


Figure 8: Fixed (wired) Broadband subscriptions per 100 inhabitants, EOY 2021

4.3.2 Curaçao fixed-broadband subscription per 100 inhabitants compared to the region, 2012-2021

In this section a comparison is made of the fixed broadband subscription per 100 inhabitants between Curaçao, Caribbean, and Central- and South America over a period of ten years. The figure below shows a relative linear growth for the entire region. For Curaçao the fixed broadband subscription per 100 inhabitants has been consistently higher than the rest of the region. Since 2016 an even more substantial increase is noted compared to the rest of the region. With this latest developments Curacao aligns itself with the ongoing connectivity levels in Europe, the United States, and Asia Pacific.

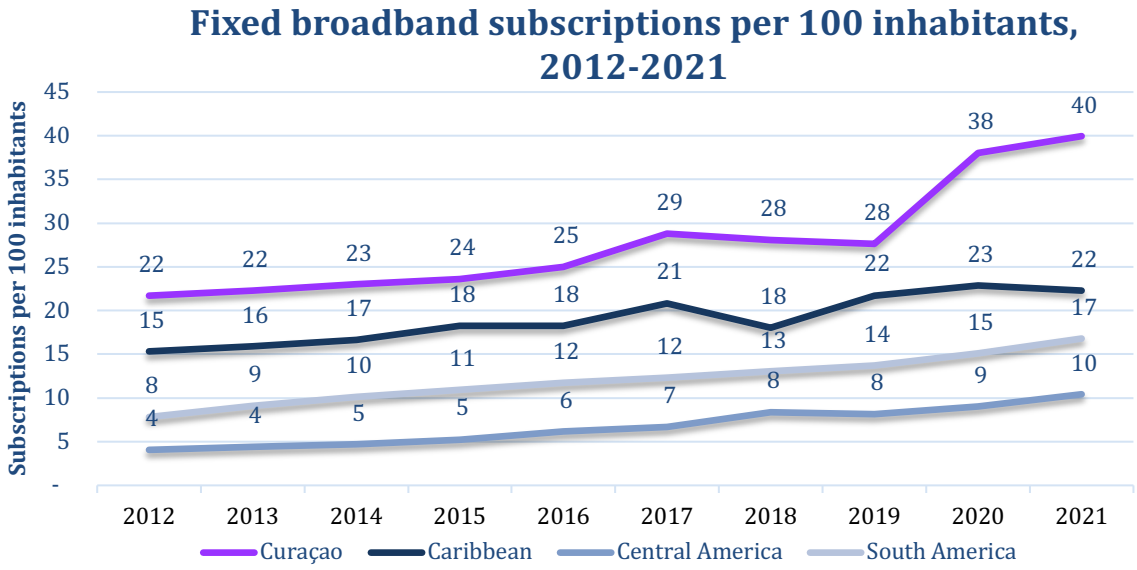


Figure 9: Fixed (wired) Broadband subscriptions per 100 inhabitants, EOY 2012- EOY 2021

4.3.3 List of regional broadband penetration levels

Compared to the list of broadband internet subscription per 100 inhabitants of the Caribbean region, South- and Central America in 2021, Curaçao is ranked in first place with a 39.95% penetration level. In 2019 and 2020 Curaçao was ranked in second place with penetration levels of respectively 32.61 and 38.04 per 100 inhabitants. This is the first time in history that Curaçao is ranked at number 1, surpassing Barbados that has been leading in the region for the last years[4].

[4] This benchmarking is done using ITU's World Telecommunication/ICT indicators database including a list of countries of which data is available and trusted.

Rank	Economy	Fixed (wired) Broadband subscriptions per 100 inhabitants
1	**Curaçao**	**39.95**
2	Barbados	36.47
3	Uruguay	32.26
4	British Virgin Islands	25.37
5	Grenada	24.46
6	Trinidad and Tobago	24.31
7	Saint Vincent and the Grenadines	23.85
8	Argentina	23.17
9	Chile	21.97
10	Saint Lucia	21.20
11	Costa Rica	20.54
12	Bahamas	20.35
13	Suriname	20.06
14	Dominica	19.45
15	Brazil	19.44
16	Aruba	17.83
17	Colombia	16.37
18	Panama	14.82
19	Jamaica	14.62
20	Ecuador	13.71
21	Paraguay	10.78
22	Dominican Rep.	9.76
23	El Salvador	9.71
24	Bolivia	9.33
25	Belize	9.00
26	Peru	8.91
27	Venezuela	8.78
28	Antigua and Barbuda	8.58
	Selected Countries	
-	Netherlands	43.51
-	Malta	41.99
-	United States	37.35
-	Singapore	------

Table 1 - List of broadband penetration in the Caribbean region 2021

4.4 Affordability of fixed-broadband internet

The affordability of the fixed-broadband internet is benchmarked based on the cheapest (entry-level) broadband internet subscription offered. For internet service providers applying a data-cap, a minimum of 5 GB data monthly usage should be considered. To make distinct prices comparable different methodologies may be followed. The benchmarking method chosen by ITU as well as by many other international institutions

is based on defining a consumption basket, i.e., specific consumption of voice and data per month and per user, that represents what the average consumption of a user would be. This basket approach matches the assumed consumption for at least one service with each of the available prices being offered by operators and from there a final expenditure is obtained for each price, given the consumption volumes assumed ex ante.

4.4.1 Fixed broadband tariffs

In December 2022, the price for an entry-level fixed-broadband internet service in Curaçao was approximately at USD 61.- monthly for a connection speed of 100 Mbit/s. The local internet service providers for fixed broadband internet (as in many other countries) do not offer their services based on maximum data usage cap. For this reason, the 5 GB data cap is not relevant for the local analysis. However, international benchmarking will still be conducted based on this factor as this is the general approach utilized by the ITU.

A comparison with the region as shown in figure 10 reveals an average price for entry-level fixed-broadband in the Caribbean of approximately USD 48.- monthly. The average price in Central- and South America is lower, at USD 26.- and USD 21.- respectively. The United States is at USD 54.- monthly and this is for internet speeds starting at 200 Mbit/s and above. The necessary caution is needed when conducting one on one benchmarking in this category as the prices for entry-level fixed broadband plans can be related to a very broad range of offered download speeds (from 1 Mbit/s up to 1000 Mbit/s).

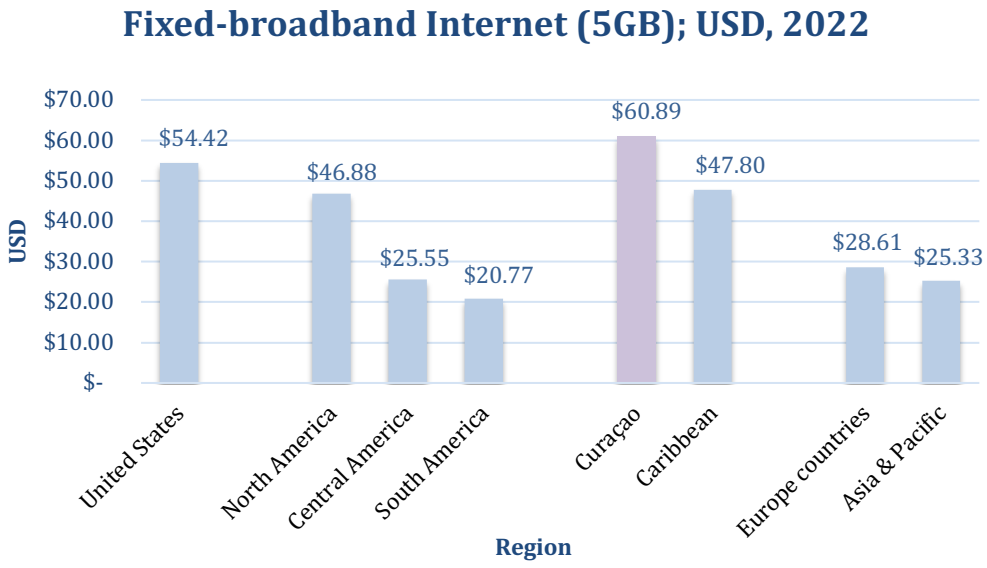


Figure 10: Fixed-broadband internet benchmark in USD, EOY 2022

4.4.2 Fixed-broadband basket

Fixed-broadband prices have been collected by the BT&P and compared with available ITU data for the rest of the region. To be able to compare prices of broadband and the affordability of these services, the BT&P is following the ITU method for comparison of entry-level broadband plans. The fixed-broadband plan methodology represents an entry-level postpaid fixed-broadband plan, with a minimum speed of 256 kbit/s and a monthly usage of (a minimum of) 5 Gigabyte (GB). The prices of the operator with the largest market share (measured by the number of subscriptions) are used. Prices are presented in USD and also calculated as a percentage of the GNI per capita, to provide an insight into the affordability of fixed broadband. Countries are ranked according to the price of fixed broadband as a percentage of GNI p.c. The lower the percentage, the lower the relative cost of the service.

For Curaçao, the entry-level fixed broadband internet service plan is at 109,00 ANG / 60,89 USD for the largest market share operator with a speed of 100 Mbit/s, including taxes. The Gross National Income (GNI) per capita of 20.569 USD is collected through The World Bank, World Development Indicators database using the latest available information. Therefore, the entry-level broadband plan in 2022 comes at 3.55 percent of the GNI per capita in Curaçao, which is clearly above the United Nations Broadband Commission for Sustainable Development 2025 target[5] of 2%. How this and other related indicators relates to the realization of the United Nations' Sustainable Development Goals (SDGs) will be further treated and analyzed in chapter 6.5. Curaçao ranks at number 13 in terms of fixed broadband affordability compared to countries in the Caribbean region, South- and Central America. It's also relevant to note how Aruba scores much better than Curacao in this benchmarking.

[5] https://www.broadbandcommission.org/about/Pages/default.aspx

Rank	Economy	as % of GNI p.c.	USD	Speed, in Mbit/s	Tax rate included (%)	GNI p.c., USD, 2022
1	Puerto Rico	1.52	26.75	1.00	11.50	24,560
2	Bahamas	1.58	34.71	8.00	12.00	31,530
3	Costa Rica	1.64	14.70	1.00	13.00	12,670
4	Chile	1.83	21.39	500.00	19.00	15,360
5	Cayman Islands	1.89	99.60	40.00		65,190
6	Uruguay	2.30	32.05	3.00	22.00	18,030
7	Dominican Rep.	2.66	18.76	5.00	30.00	9,050
8	Peru	2.99	16.01	25.00		6,770
9	Brazil	3.05	20.32	250.00	23.25	8,140
10	Saint Kitts and Nevis	3.15	47.23	25.00	17.00	19,730
11	Aruba	3.20	60.72	150.00	3.50	29,460
12	Trinidad and Tobago	3.35	40.72	100.00	12.50	16,330
13	**Curaçao**	**3.55**	**60.89**	**100.00**	**6.00**	**20,569**
14	Barbados	3.56	49.50	100.00		19,350
15	Suriname	3.61	11.28	5.00	12.00	4,880
16	Panama	3.75	42.80	250.00	7.00	16,750
17	Colombia	3.80	18.09	75.00	0.00	6,510
18	Paraguay	4.00	17.07	120.00	10.00	5,920
19	Saint Lucia	4.73	37.04	150.00	12.50	11,160
20	Ecuador	4.74	23.41	5.00	12.00	6,310
21	Antigua and Barbuda	4.83	59.26	10.00		18,280
22	Grenada	4.89	38.52	150.00		9,340
23	Dominica	5.57	35.19	15.00	15.00	8,460
24	Argentina	5.66	40.00	50.00	21.00	11,620
25	Guatemala	6.26	25.88	15.00	12.00	5,350
26	El Salvador	6.67	23.00	20.00		4,720
27	St. Vincent & Grenadines	6.71	44.44	250.00	16.00	9,110
28	Belize	6.98	24.50	20.00	12.50	6,800
29	Bolivia	8.30	23.01	20.00	13.00	3,450
30	Jamaica	8.91	32.50	30.00	25.00	5,670
	Selected Countries					
-	Singapore	0.64	33.34	1024.00	7.00	67,200
-	Malta	0.91	21.28	30.00	18.00	33,550
-	United States	0.93	54.42	200.00	8.80	76,370
-	Netherlands	1.06	45.78	100.00	21.00	57,430

Table 2 - Affordability of fixed broadband basket 2022

4.5 Average download speeds

Fixed broadband internet has had a very rapid growth in terms of penetration achieved over households and firms. At the beginning of the 2000´s the first fixed internet connections were offered via the copper-based network of the incumbent operator. Data speeds were low. In the following years, with the different xDSL upgrades and the introduction of cable-TV networks using several DOCSIS transmission standards, higher and higher speeds were offered. Also, with the later introduction of fiber networks in Curaçao in the last decade, even more higher transmission speeds were made possible. The broadband internet speed developments over the last twelve years can clearly be seen in figure 11. Similar to the last years, the national average download speed continued its upward trend in 2023. In 2023 a much larger increase in download speeds has been identified compared to the previous years. This is mainly contributed to the large-scale digitalization that took place around the COVID-19 pandemic in which individuals, organizations and educational institutions were forced to work from home and adapt their digital strategy. For this a stable, reliable and high-speed broadband connection was critically needed which forced the upgrading of thousands of connections with the Internet Service provider. In the years hereafter, the ISPs also started offering higher connection speeds against more affordable prices. In the EOY 2023, the estimated average download speed recorded was approximately 68.10 Mbit/s. This data is retrieved from the Ookla Speedtest Intelligence tool for which special user rights and access were obtained by the Bureau Telecommunicatie en Post to conduct in-depth data analysis. Although Curaçao is very well positioned in the region with an average download speed of 68.10 Mbit/s, the most developed countries in the world are showing average national download speeds of around 200 to 300 Mbit/s and up.

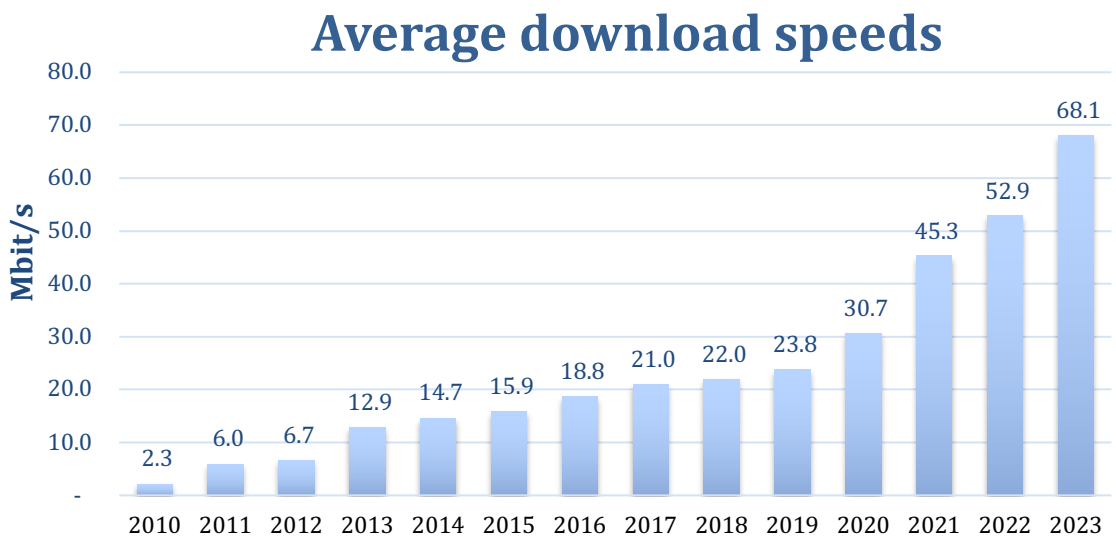


Figure 11: Average download speeds, 2010 – 2023

5 MOBILE-CELLULAR NETWORK

5.1 Mobile-cellular-voice telephone subscriptions

The past years the mobile market experienced an overall downward trend in terms of number of subscriptions. Over the last 10 years the total number of mobile subscriptions declined with a total amount of approximately 34 thousand subscriptions representing an overall 17% decrease in the mobile market[6]. A more detailed explanation of the drop in the total number of mobile subscribers will be given in the following sections of this chapter.

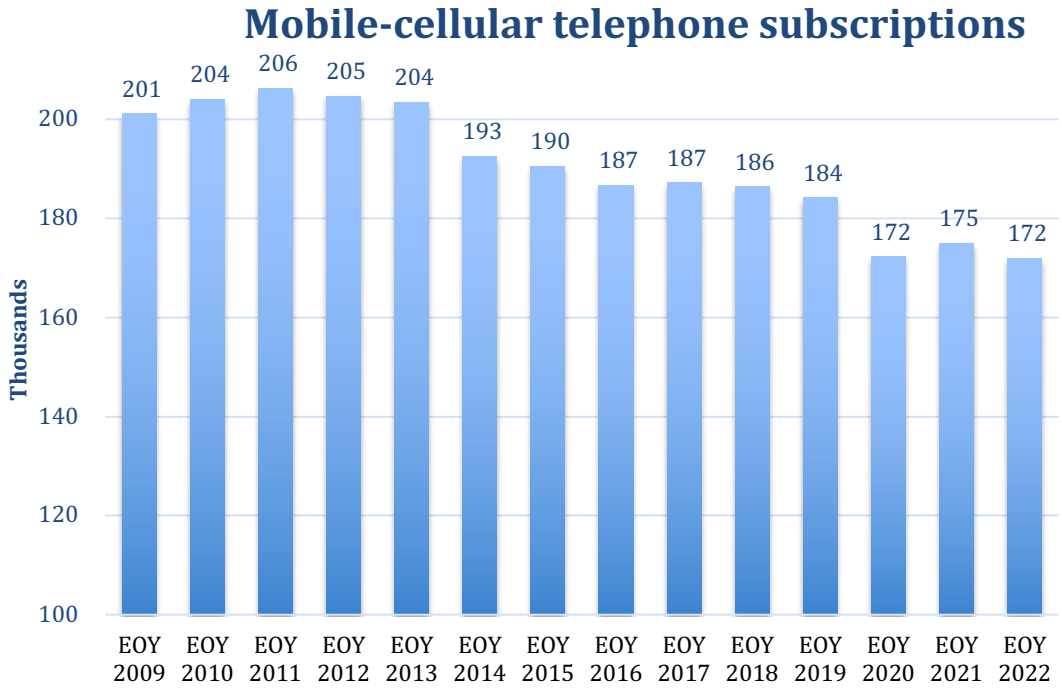


Figure 12: Mobile-cellular telephone subscriptions, EOY 2009 – EOY 2022

[6] The number of the subscribers for the last three years is based on provisional figures that still need to be audited.

5.2 Mobile-cellular-voice per 100 inhabitants

The ITU uses the term (indicator) mobile-cellular-voice per 100 inhabitants to measure the number of subscriptions for every 100 inhabitants in a particular region. This indicator is calculated as the number of mobile-cellular telephone subscriptions divided by the population and multiplied by 100. This gives an overall good indication of the mobile penetration levels in a specific country.

5.2.1 Mobile-cellular-voice subscriptions per 100 inhabitants

In December 2021, the mobile penetration rate in Curaçao was 115.9. This means that there were approximately 116 mobile-cellular-voice subscriptions per 100 inhabitants in at the end of 2021. As shown in figure 13, the mobile penetration rates in Curaçao are comparable to the region results of the Caribbean, South- and Central America and also to the World, Developed- and Developing-countries. Curaçao is in the same trend as compared to the rest of the region and to other developed countries. See Appendix D1 for a list of countries and source data.

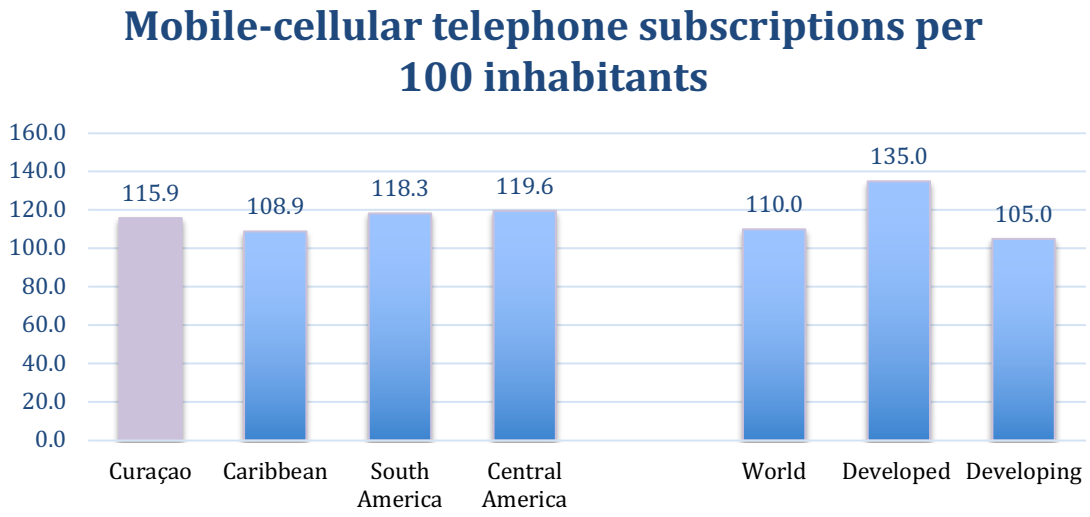


Figure 13: Mobile-cellular voice subscriptions per 100 inhabitants, EOY 2021

Figure 14 gives a projection of the numbers of mobile-cellular-voice subscriptions per 100 inhabitants related to the total number of subscriptions from the years 2012 to 2022. One of the factors contributing to the decreasing numbers of subscriptions over the last few years has to do with the fact that in the past many end users had two mobile phones with subscriptions to both local established mobile operators. Many circumstances in the mobile market have changed and for this reason end users nowadays are mostly carrying one smart phone connected to one mobile operator which gives them lots of communication possibilities that were not possible in the past.

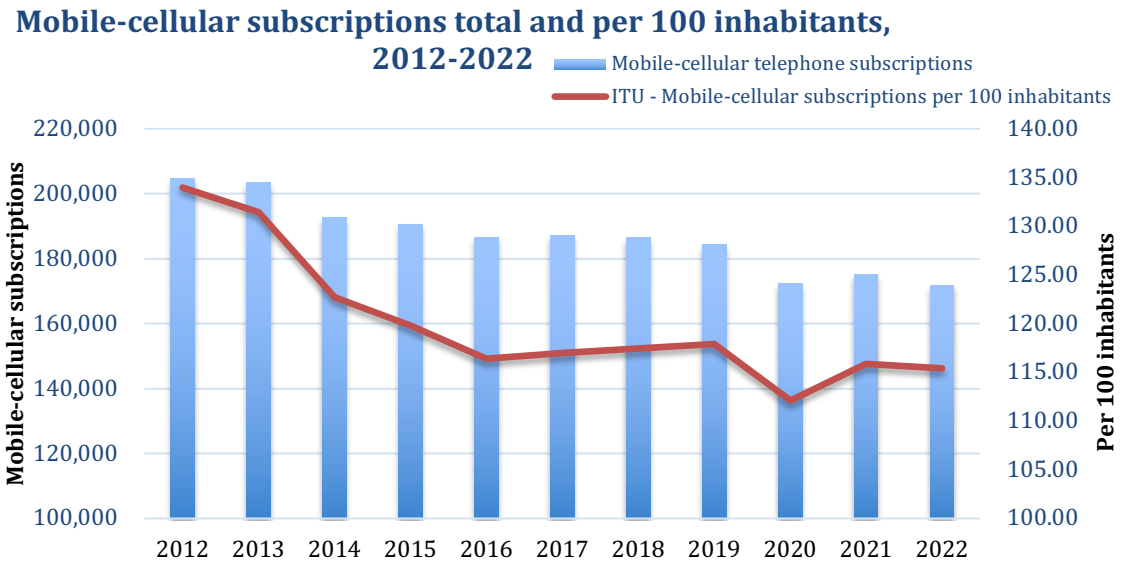


Figure 14: Mobile-cellular subscriptions total and per 100 inhabitants, EOY 2012- 2022

5.2.2 Curaçao mobile-cellular-voice subscription per 100 inhabitants compared to the region, 2012-2021

The figure below gives an indication of the rate for mobile-cellular-voice subscriptions per 100 inhabitants over the period 2012 to 2021 between Curaçao, the Caribbean, Central- and South America. An overall decreasing trend can be noticed over the last few years but still with penetration levels of above 100%. These are normal expectations for the region as technology improves, mobile data services are becoming dominant, and more and more people are sticking with one provider rather than using two mobile phones connected to different operators.

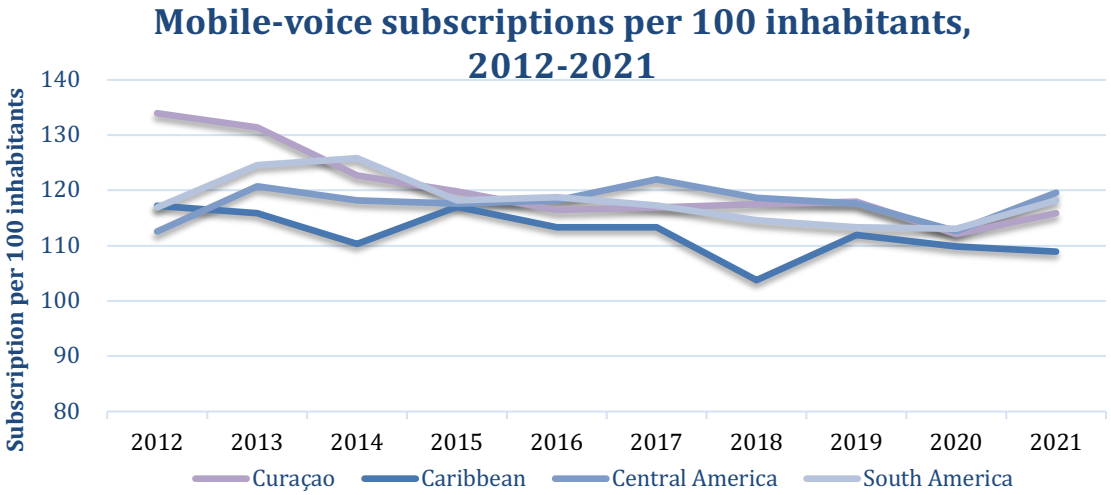


Figure 15: Mobile-cellular-voice subscriptions per 100 inhabitants, EOY 2012-2021

5.2.3 List of regional mobile-cellular-voice subscriptions per 100 inhabitants

In this paragraph the list of the mobile-cellular-voice subscription per 100 inhabitants is presented for comparison purposes for the whole Americas region. Curaçao shows an exact rate of 115.87, for which it is ranked at the 16th place in EOY 2021 see table 3. However, care must be taken when interpreting and benchmarking this specific set of data as market circumstances and economy variations may lead to different results in different markets. For example, for this specific indicator a low penetration level (but still close to 100%) doesn't necessarily mean a lack in sector development. The contrary might be the case under certain specific circumstances. As a matter of fact, in a well-developed market there's no evident reason for end users to carry two mobile phones connected to distinct operators, only if luxury permits.

Rank	Economy	Mobile-cellular-voice subscriptions per 100 inhabitants	Ranking 2021
1	Antigua and Barbuda	197.38	1
2	El Salvador	175.34	2
3	Costa Rica	152.01	4
4	Suriname	147.83	3
5	Panama	147.70	5
6	Colombia	145.69	6
7	Uruguay	136.92	7
8	Chile	136.31	10
9	Aruba	132.35	8
10	Trinidad and Tobago	130.88	9
11	Argentina	130.46	11
12	Peru	127.84	13
13	Guatemala	125.65	14
14	British Virgin Islands	120.95	16
15	Paraguay	118.96	12
16	**Curaçao**	**115.87**	**17**
17	Barbados	112.60	19
18	Puerto Rico	112.44	18
19	Jamaica	102.75	21
20	Brazil	102.49	23
21	Bolivia	99.62	22
22	Bahamas	97.42	15
23	Nicaragua	97.11	26
24	Saint Lucia	95.63	29
25	Ecuador	94.34	27
26	Saint Vincent and the Grenadines	94.15	25
27	Dominican Rep.	87.56	28
28	Dominica	85.86	20

	Selected Countries	
-	Singapore	147.48
-	Qatar	144.20
-	Netherlands	125.06
-	Malta	123.38
	United States	107.32

Table 3 - List of mobile-cellular-voice subscription per 100 inhabitants in the Caribbean region

5.3 Mobile-cellular networks developments and average download speeds

In this section of the report specific attention is given to indicators related to mobile-cellular subscriptions and mobile broadband in terms of network coverage by type of technology and related advancements over the last years. Mobile cellular networks are increasingly used for a number of services: voice, messaging, accessing the Internet, cloud services, gaming, online meetings, and to carry out other digital services, such as e-banking, e-commerce (utilizing mobile payments) and e-administration. These networks have gone through a rapid growth and degree of technological innovations over the last years. Every decade a new international standard came into place and the mobile networks in Curacao were right on top of these technological advancements.

Mobile communications began with analogue first generation (1G) networks that launched the mobile revolution worldwide. This was followed by 2G networks that used digital technology and introduced simple messaging services (SMS). Later came the 3G/UMTS (Universal Mobile Telecommunications System) set of technologies by which mobile broadband became a reality, back then at typical download speeds of less than 1 Mbps. Over the years with the new developments of High-Speed Packet Access (HSPA) versions and its continuous advancements towards HSPA+, typical download speeds of around 20 Mbps were made available by mobile service providers on Curacao.

Less than 10 years ago a new standard was developed: 4G/LTE, supporting much higher data connection speeds and with it came a whole new world of digital applications that demanded high capacity and speed networks with better performance. Nowadays the mobile networks on Curacao operates on this technology and are providing real average download speeds of above 50 Mbps and average upload speeds of around 15 Mbps. This data is retrieved from the Ookla Speedtest Intelligence tool for which special user rights and access were obtained by the Bureau Telecommunicatie en Post to conduct in-depth data analysis.

Recently, the new 5G standard is already being implemented in many countries of the world. This will make ultra-high speed and minimal latency for a completely new line of services (i.e. connected vehicles, emergency services and public safety, massive and industrial machine type communications, etc.) a new reality.

In Curacao the mobile broadband market experienced for the first time a significant increase in numbers of subscriptions in 2013 with the introduction of High-Speed Packet Access (HSPA+). The move towards 3G networks has paved the way for the provision of services at broadband mobile internet access speeds, a significant step up from the 2.5G technology (i.e. Enhanced Data Rates for GSM Evolution – EDGE). With the introduction of LTE since 2015 and available higher speeds, the total number of subscriptions has reached even higher numbers.

Since mobile network usage has become the predominant method of telecommunications across the world, it is highly important to measure the coverage of these networks. Coverage implies that a specific population or land area receives an adequate signal offered by an operator such that the service, be it making calls or accessing the Internet, is possible. Mobile network coverage provides a good approximation of the universality of Internet access and is also used as a tracking indicator for Sustainable Development Goals (SDG, see chapter 6.4). Figure 16 below gives a good representation of how the mobile technologies developed over the last years in Curacao with regards to coverage by type of network. This is very much in line with other international developments as projected by the ITU.

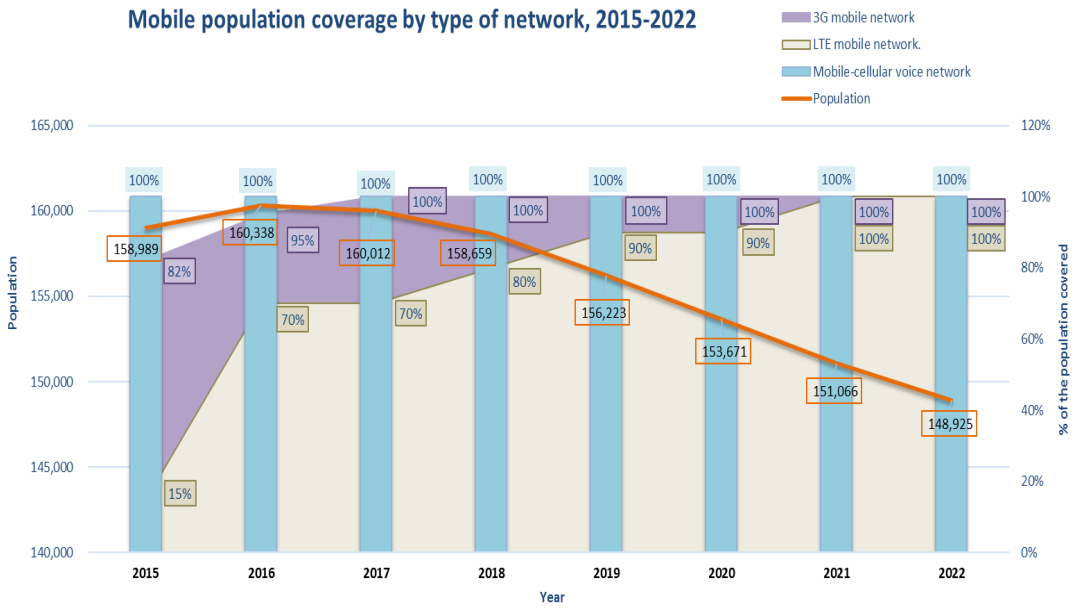


Figure 16: Mobile coverage by type of network

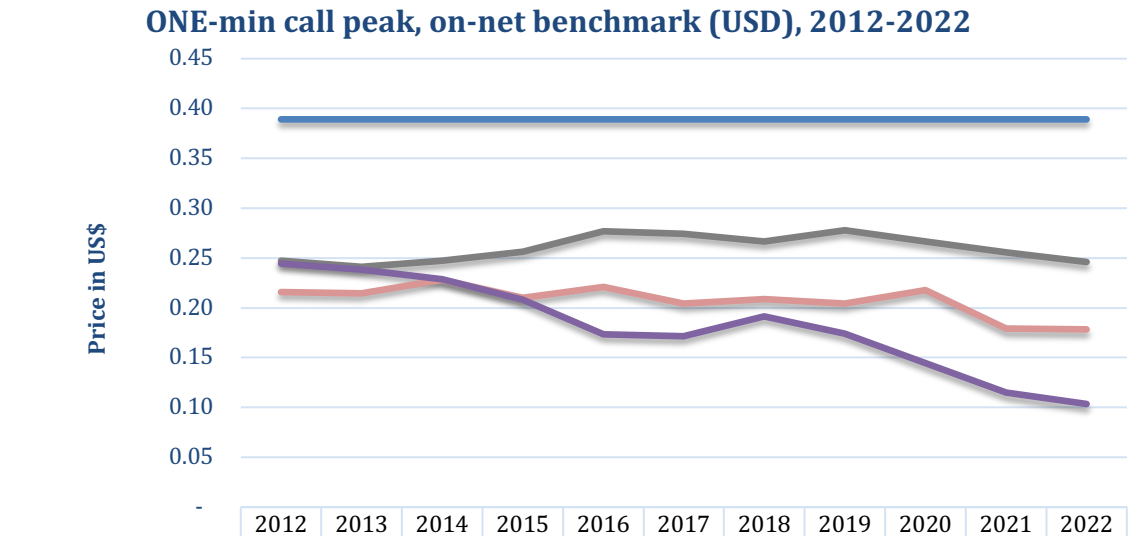
5.4 Affordability of mobile-cellular services

For the affordability of mobile services, the mobile-cellular-voice tariffs and mobile-broadband (data only) packages will be analyzed in this paragraph. Local prices will be analyzed and then compared against the region and other specific countries in the world using ITU's predefined benchmarking criteria.

5.4.1 Mobile-cellular-voice telephone tariffs

Mobile-cellular-voice telephone tariffs can be analyzed and benchmarked according to different indicators and metrics. Prices may be different based on the terminating network, either fixed or mobile, on-net calls to the same network or off-net calls to a different provider, or calls made during peak or during off-peak hours. For this analysis we will focus on the tariffs of a one-minute on-net call during peak hours.

In Curaçao a one-minute mobile-cellular-voice on-net call on peak hours has been consistent at 0.39 USD (including 6% tax) for the last eleven years. The prices in Curaçao at this moment offered by local mobile services providers are still significantly higher than the Caribbean average and Central- and South America. See figure 17 below for a graphical representation and appendix D2 for a detailed list of countries and source data.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Curaçao	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Caribbean	0.25	0.24	0.25	0.26	0.28	0.27	0.27	0.28	0.27	0.26	0.25
Central America	0.22	0.21	0.23	0.21	0.22	0.20	0.21	0.20	0.22	0.18	0.18
South America	0.24	0.24	0.23	0.21	0.17	0.17	0.19	0.17	0.14	0.12	0.10

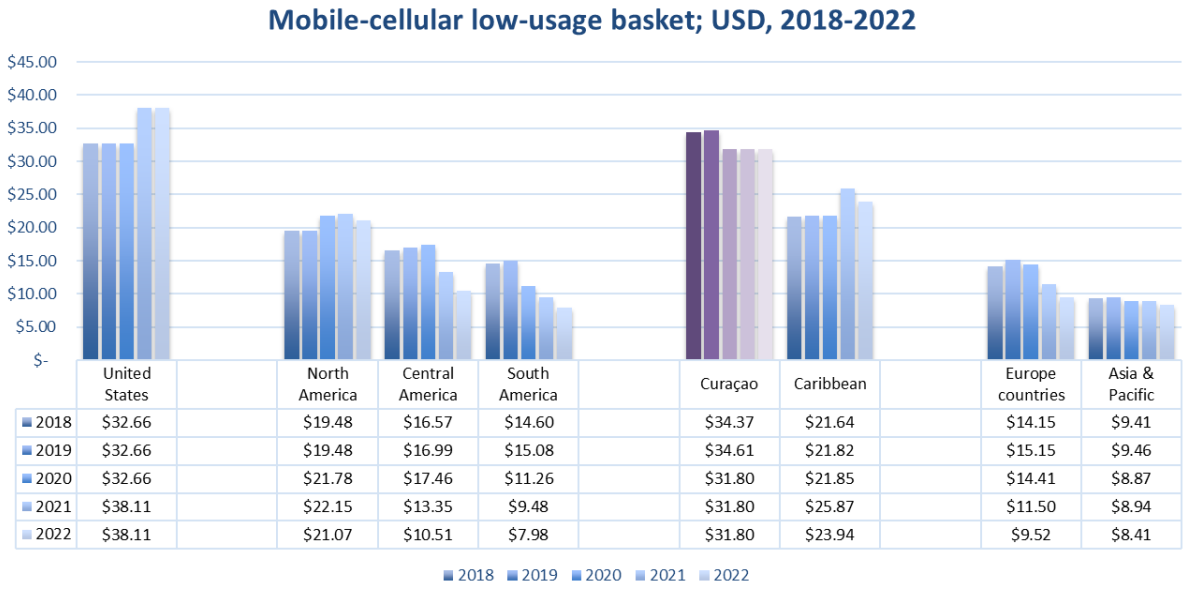
Figure 17: Mobile-cellular price of 1-min peak call, on-net, compared to the region,2012-2022

5.4.2 Mobile-cellular-voice basket

This section analyses the prices for the mobile-cellular-voice basket. With this new revised ITU method, the basket is calculated based on a combination of voice and text messages only, without any mobile-data allowance. The data used for this calculation is based on the price for 70 voice minutes and 20 text messages per month in predetermined on-net/off-net/fixed ratios. The previous mobile-voice basket applied until 2017, contained 30 calls and 100 text messages.

The Bureau Telecommunicatie en Post took notice that the ITU conducted miscalculations on this price basket for Curacao in their benchmarking over the last two years. For this reason, we maintained the information and calculation procedures as applied by BTP since 2021 in this section.

The calculated mobile-cellular-voice basket in Curaçao for EOY 2022 is USD 32. As shown in figure 18 below, this is considerably higher when compared to the Caribbean, North-, Central- and South America. In European countries and many regions of the world the prices are clearly in a declining trend. The average price of the mobile-cellular-voice basket EOY 2022 in the Caribbean is around USD 24 which is around eight dollars cheaper than the price in Curaçao.



	United States	North America	Central America	South America	Curaçao	Caribbean	Europe countries	Asia & Pacific
2018	$32.66	$19.48	$16.57	$14.60	$34.37	$21.64	$14.15	$9.41
2019	$32.66	$19.48	$16.99	$15.08	$34.61	$21.82	$15.15	$9.46
2020	$32.66	$21.78	$17.46	$11.26	$31.80	$21.85	$14.41	$8.87
2021	$38.11	$22.15	$13.35	$9.48	$31.80	$25.87	$11.50	$8.94
2022	$38.11	$21.07	$10.51	$7.98	$31.80	$23.94	$9.52	$8.41

Figure 18: Mobile-cellular-voice basket in USD, EOY 2018 - 2022

While absolute prices are important, comparing these with the average net income per month for the country gives better insight in the affordability of mobile cellular usage. Table 4 gives an overview of this analysis and benchmark for the region. Curaçao

positions itself on the 17th place with a mobile-voice-basket of 1.86 percent of the GNI p.c. It's very important to take note and consider that Curacao is part of a limited number of countries that offer unlimited voice and SMS in the analyzed plan. This should give Curacao an overall better benchmarking position than what is actually represented in the table below.

Rank	Economy	% GNI p.c.	USD	Voice (in minutes)	SMS	Tax rate included %	GNI p.c., USD, 2022
1	Argentina	0.48	3.39	Unlimited	54.00	26.26	11,620
2	Chile	0.51	5.95	150.00	20.00		15,360
3	Costa Rica	0.52	4.69	70.00	20.00	13.00	12,670
4	Cayman Islands	0.57	29.99	70.00	20.00		65,190
5	Panama	0.79	8.99	70.00	20.00	7.00	16,750
6	Brazil	0.91	6.04	Unlimited	Unlimited	38.40	8,140
7	Uruguay	0.96	13.43	70.00	20.00		18,030
8	Colombia	0.97	4.59	70.00	20.00	23.00	6,510
9	Peru	0.97	5.20	70.00	20.00		6,770
10	Bahamas	1.02	22.40	70.00	20.00	10.00	31,530
11	Puerto Rico	1.26	22.30	Unlimited	Unlimited	11.50	24,560
12	Trinidad and Tobago	1.35	16.35	70.00	20.00	12.50	16,330
13	Dom. Rep.	1.39	9.79	100.00	500.00	30.00	9,050
14	Aruba	1.40	26.50	70.00	20.00		29,460
15	Jamaica	1.46	5.33	70.00	20.00	25.00	5,670
16	St Kits & Nevis	1.64	24.56	70.00	20.00		19,730
17	**Curaçao**	**1.86**	**31.80**	**Unlimited**	**Unlimited**	**6.00**	**20,569**
18	Antigua and Barbuda	2.14	26.33	70.00	20.00		18,280
19	Ecuador	2.29	11.34	200.00	20.00	12.00	6,310
20	Saint Lucia	2.93	22.96	70.00	20.00	12.50	11,160
21	El Salvador	2.96	10.22	70.00	20.00	18.00	4,720
22	Paraguay	3.03	12.91	Unlimited	100.00	10.00	5,920
23	Guatemala	3.12	12.87	Unlimit on-net, 1000 off-net	60.00	12.00	5,350
24	Bolivia	3.34	9.26	76.00	20.00	13.00	3,450
25	Barbados	3.59	50.00	Unlimited on-net, 300 off-net	Unlimited	21.00	19,350
26	St Vincent and the Grenadines	3.77	25.01	70.00	20.00	16.00	9,110
27	Belize	3.85	13.50	270.00	Unlimited	12.50	6,800
28	Haiti	3.87	4.63	70.00	20.00	10.00	1,610
29	Suriname	4.88	15.25	70.00	20.00	12.00	4,880
30	Grenada	4.93	38.89	1400.00	20.00		9,340
31	Dominica	5.86	37.04	Unlimited	Unlimited	15.00	8,460
32	Nicaragua	6.06	9.78	Unlimited on-net, 100 off-net	5000.00	15.00	2,090
Selected Countries							
-	Malta	0.23	5.31	100.00	100.00	18.00	33,550
-	Qatar	0.23	11.76	350.00	20.00	0.00	70,500
-	Singapore	0.25	13.07	1000.00	500.00	7.00	67,200
-	Netherlands	0.41	17.57	75.00	75.00	21.00	57,430

Table 4 - Mobile-voice basket, 2022

5.4.3 Mobile broadband tariffs

The prices for offered mobile broadband services can be analyzed and compared in several ways. Figure 19 below gives an overview of the development of mobile broadband tariffs for a 30-day plan offered by the local operators over the last nine years. As can be seen, there's a broad range of mobile data services offered starting from entry-level packages with low data consumption up to more expensive packages including higher data caps[7].

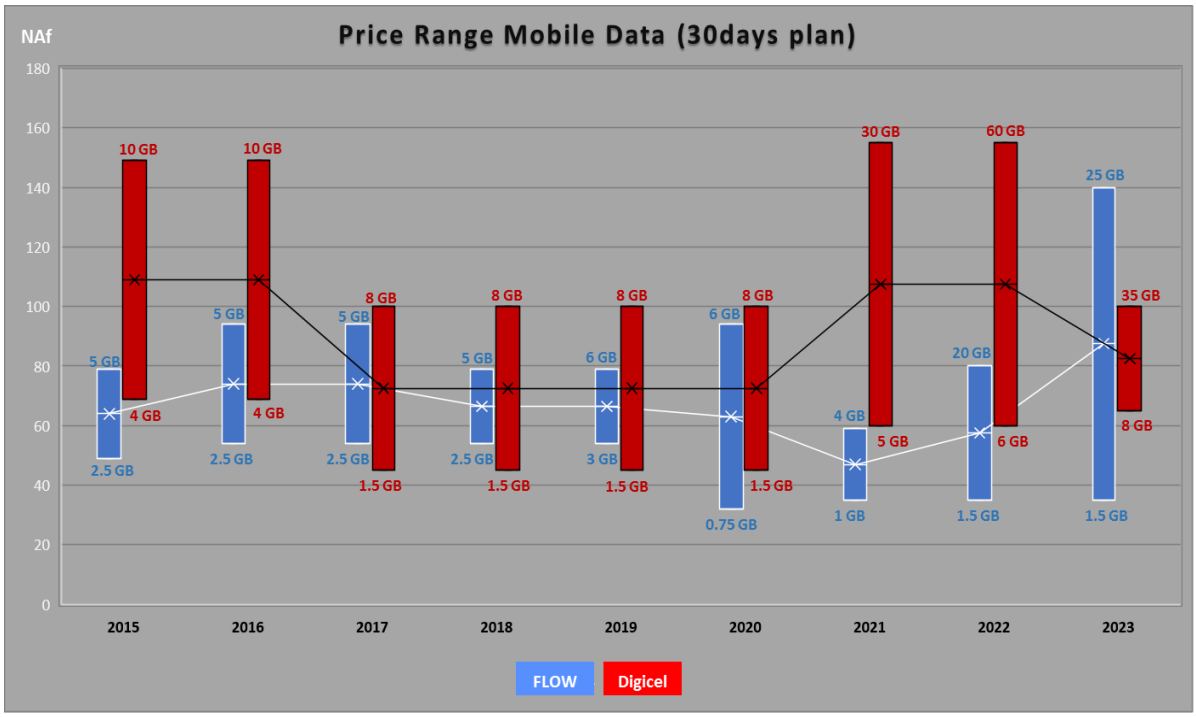


Figure 19: Prices of mobile broadband packages in NAf, 2015 - 2023

To be able to compare prices of mobile broadband, the BT&P is following the ITU method for comparison of entry-level plans based on a minimum of 2.0 GB data allowance per month. See figure 20 below for the benchmarking results with the region of the Americas, Europe countries and Asia & pacific. In December 2022, the price for an entry-level mobile-broadband internet service in Curaçao was approximately at USD 32.96. While Curacao seems to have higher prices than the rest of the world, it should be noted that this is for 4 GB of monthly data (twice the minimum benchmarked data by ITU). The same counts for the United States in which ISPs usually offers more data than the minimum benchmarked 2GB by the ITU.

[7] The prices are expressed in local NAF. guilders as this is not an internationally benchmarked standard.

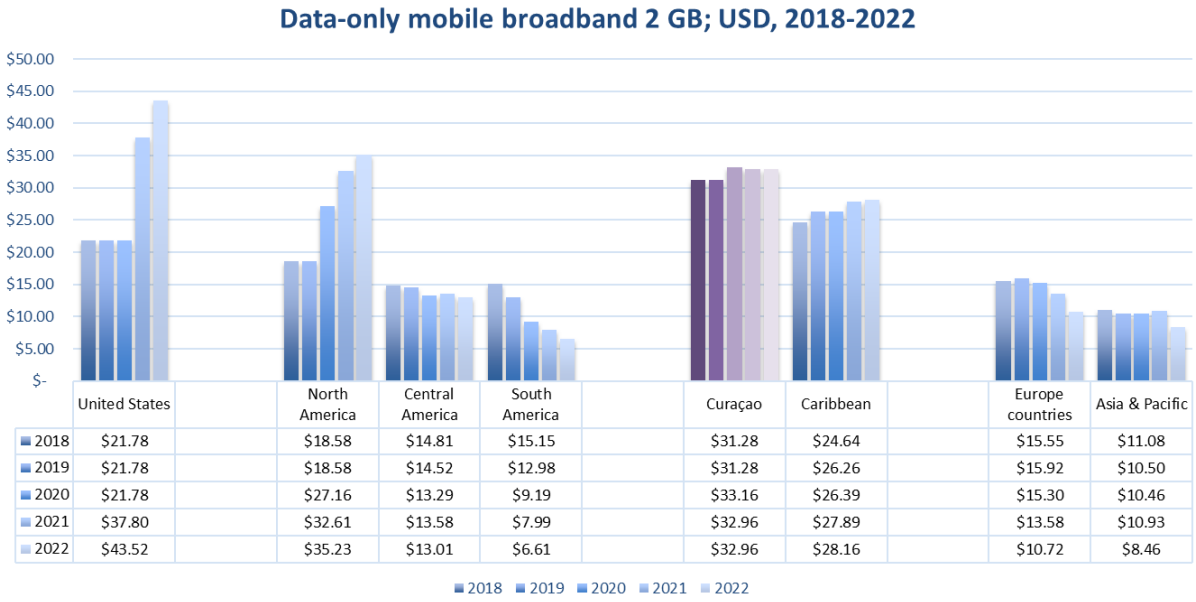


Figure 20: Mobile broadband internet (2 GB) benchmark in USD, EOY 2018- 2022

5.4.4 Mobile data basket

Mobile broadband prices have been collected by the BT&P and compared with available ITU data for the rest of the region. To make the right comparisons and benchmark the affordability of these services, the BT&P uses the ITU method of entry-level plans based on the mobile data basket approach. The mobile-data basket is defined by the cheapest price for a data plan with a monthly allowance of at least 2.0 GB. The selected plan should not necessarily be the one with the cap closest to 2.0 GB, but must include a minimum of 2.0 GB. The as % of the GNI p.c. is calculated by dividing the monthly price for the data plan by the monthly average GNI of a specific country. Table 5 shows the ranking of the entry-level broadband services affordability based on GNI p.c. Curaçao is ranked in the 15th place with a result of 1.92 percent of the GNI p.c.

Rank	Economy	as % of GNI p.c.	Price USD	Monthly data allowance (in GB)	Technology	Tax rate included %	GNI p.c., USD, 2022
1	Chile	0.41	4.76	4.00	4G		15,360
2	Argentina	0.48	3.39	2.00	4G	26.00	11,620
3	Brazil	0.55	3.66	2.00	LTE	38.38	8,140
4	Uruguay	0.71	9.86	2.00	4G		18,030
5	Cayman Islands	0.80	42.00	3.00	LTE		65,190
6	Costa Rica	0.98	8.76	4.00	UMTS/LTE	13.00	12,670
7	Bahamas	1.09	24.00	2.40	LTE	10.00	31,530
8	Puerto Rico	1.26	22.30	4.00	LTE	11.50	24,560
9	Peru	1.39	7.47	4.00	4G		6,770

10	Aruba	1.44	27.37	8.00	LTE		29,460
11	Colombia	1.50	7.15	8.00	LTE	19.00	6,510
12	Dominican Rep.	1.54	10.87	2.10	LTE	30.00	9,050
13	Bolivia	1.57	4.34	2.00	LTE	16.00	3,450
14	Panama	1.87	21.40	Unlimited	LTE	7.00	16,750
15	**Curaçao**	**1.92**	**32.96**	**4.00**	**4G - LTE**	**6.00**	**20,569**
16	Ecuador	2.02	10.00	10.00	LTE	12.00	6,310
17	Paraguay	2.07	8.84	2.80	UMTS and LTE	10.00	5,920
18	Saint Kitts and Nevis	2.47	37.04	10.00	4G		19,730
19	Trinidad and Tobago	2.73	33.15	10.00	LTE	12.50	16,330
20	El Salvador	2.90	10.00	5.00	4G		4,720
21	Dominica	2.93	18.52	12.00	4G/LTE		8,460
22	Antigua and Barbuda	3.02	37.04	8.00	4G		18,280
23	Guatemala	3.12	12.87	13.00	LTE, UMTS, HSPA(+), HSUPA	12.00	5,350
24	Barbados	3.23	45.00	12.00	LTE	21.00	19,350
25	Suriname	3.52	11.00	5.00	LTE	12.00	4,880
26	Belize	3.85	13.50	4.40	4G	12.00	6,800
27	Grenada	4.70	37.04	12.00	LTE		9,340
28	Saint Lucia	4.73	37.04	10.00	LTE		11,160
29	Nicaragua	4.85	7.82	2.80	LTE	15.00	2,090
30	Jamaica	5.35	19.51	12.00	LTE	25.00	5,670
	Selected Countries						
-	Singapore	0.18	9.44	2.50		7.00	67,200
-	Qatar	0.30	15.11	2.50		0.00	70,500
-	Malta	0.46	10.64	8.00		18.00	33,550
-	Netherlands	0.47	20.23	3.00		21.00	57,430

Table 5 – Mobile-data basket, 2022

5.4.5 Mobile data and voice high-consumption basket

Since 2020, the BT&P has been collecting data from the local telecom providers for the price basket that combine data, voice and SMS. In collecting the information related to mobile data and voice, the ITU uses a methodology that splits the information into low and high consumption. The information is split as follows:

- Low-consumption basket: 70 voice minutes, 20 SMSs and 500 MB of data;
- High-consumption basket: 140 voice minutes, 70 SMSs and 2.0 GB of data.

In this report only the information of the high consumption is treated. The BT&P has chosen this category, as this information is more relevant and represents the local market more. The price basket EOY 2022 that combines the high-consumption of data, voice

and SMS has been collected by the BT&P and is compared with available ITU data for the rest of the region. The selected plans of largest market share operators should include a minimum of 140 voice minutes, 70 SMSs and 2.0 GB of broadband data, as mentioned above. Table 6 below gives an overview of this analysis and benchmark for the region. Curaçao positions itself on the 20th place with a mobile data and voice high-consumption basket of 3.13 percent of the GNI p.c. Again, considering that local leading operators offer 8 GB of data in the analyzed plan, it is obvious that Curacao should get an overall better benchmarking position than what is actually represented in the table below.

				Monthly allowance				
Rank	Economy	as % of GNI p.c.	Price USD	voice (in minutes)	SMS	Data (in GB)	Tax rate included %	GNI p.c., USD, 2022
1	Argentina	0.62	4.40	Unlimited	70.00	2.00	26.00	11,620
2	Chile	0.76	8.92	150.00	70.00	4.00		15,360
3	Brazil	0.92	6.09	Unlimited	Unlimited	6.00	25.02	8,140
4	Costa Rica	0.98	8.76	210.00	70.00	4.00	13.00	12,670
5	Cayman Islands	0.99	52.08	Unlimited	70.00	3.00		65,190
6	Bahamas	1.09	24.00	200.00	200.00	2.40	10.00	31,530
7	Puerto Rico	1.26	22.30	Unlimited	Unlimited	4.00	11.50	24,560
8	Peru	1.39	7.47	Unlimited	8080.00	4.00		6,770
9	Colombia	1.50	7.15	Unlimited	Unlimited	5.20	23.00	6,510
10	Aruba	1.77	33.52	1000.00	100.00	9.00		29,460
11	Panama	1.87	21.40	Unlimited	Unlimited	5.00	7.00	16,750
12	Saint Kitts and Nevis	2.47	37.04	1000.00	1000.00	10.00		19,730
13	Uruguay	2.69	37.46	140.00	70.00	2.00		18,030
14	Trinidad and Tobago	2.73	33.15	Unlimited	Unlimited	10.00	12.50	16,330
15	El Salvador	2.90	10.00	Unlimited	Unlimited	5.00		4,720
16	Ecuador	2.97	14.70	200.00	70.00	10.00	12.00	6,310
17	Antigua and Barbuda	3.02	37.04	800.00	800.00	8.00		18,280
18	Paraguay	3.03	12.91	Unlimited	100.00	4.00	10.00	5,920
19	Guatemala	3.12	12.87	200.00	200.00	10.00	12.00	5,350
20	**Curaçao**	**3.13**	**53.63**	**Unlimited**	**Unlimited**	**8.00**	**6.00**	**20,569**
21	Dom. Rep.	3.32	23.45	Unlimited	1000.00	5.00	30.00	9,050
22	Barbados	3.59	50.00	Unlimited	Unlimited	8.00	21.00	19,350
23	Belize	3.85	13.50	270.00	Unlimited	4.40	12.50	6,800
24	Grenada	5.17	40.74	Unlimited	Unlimited	10.00		9,340
25	Saint Lucia	5.39	42.22	2500.00	70.00	10.00		11,160
26	Jamaica	5.81	21.21	2000.00	70.00	12.00	25.00	5,670
27	Dominica	5.86	37.04	Unlimited	Unlimited	25.00	15.00	8,460
28	Nicaragua	6.06	9.78	Unlimited	5000.00	17.50	15.00	2,090
29	St Vincent and the Grenadines	6.29	41.70	1000.00	70.00	12.00	16.00	9,110
30	Bolivia	7.36	20.41	140.00	70.00	2.00	13.00	3,450

	Selected Countries							
-	Singapore	0.25	13.07	1000.00	500.00	2.00	7.00	67,200
-	Qatar	0.33	16.48	140.00	70.00	2.00	0.00	70,500
-	Malta	0.46	10.64	200.00	200.00	8.00	18.00	33,550
-	Netherlands	0.49	21.29	Unlimited	Unlimited	3.00	21.00	57,430

Table 6 – Mobile data and voice high-consumption basket, 2022

5.5 Mobile spectrum allocation

Mobile communications use the spectrum available, which is public and scarce resource. Spectrum is divided into several specific frequency bands and they define the capacity to transmit signals over airwaves. Spectrum is a vital resource that the BT&P allocate to operators with a valid license to provide connectivity for all. The innovations and technological improvements that have taken place in wireless networks allows mobile connectivity, increasing capacity and speed rates, low latency, and high-quality communications.

This section analyzes the total amount of spectrum allocated to mobile operators for International Mobile Telecommunications (IMT) systems. The ITU identifies the following blocks of frequency bands for IMT:

1. Frequency bands below 1 GHz;
2. Frequency bands in between 1 GHz and 6 GHz;
3. Frequency bands above 6 GHz.

These frequency blocks are broken down again into several sub-bands by the regulatory administrations. It is one of BT&P's duties to make the most efficient possible use of our spectrum resources, and where appropriate to free up more spectrum for new services. The table below gives an overall representation of how these frequency bands are divided into several sub-bands of particular relevance in Curaçao, including the amount of allocated and licensed spectrum to mobile operators.

As can be seen, from a total available of 4210 MHz spectrum, only 310 MHz is licensed to operational mobile telecom providers. As it is anticipated that 5G will make its introduction in the near future, there will be enough spectrum for operators to expand their services. With the additional allocations of the frequency bands above 6 GHz, there will be no shortage in spectrum for the time being.

	IMT licensed spectrum and allocations	
	Licensed to operators	**Allocated by BTP**
Sub 1 GHz block		
700 MHz band	40 MHz	90 MHz
850 MHz band	50 MHz	70 MHz
900 MHz band	30 MHz	30 MHz
Sub total	**120 MHz**	**190 MHz**
1 - 6 GHz block		
1800 MHz band	110 MHz	150 MHz
2100 MHz band	10 MHz	100 MHz
2300 MHz band	80 MHz	80 MHz
2500 - 2700 MHz band	0 MHz	190 MHz
3300 - 3400 MHz band	0 MHz	100 MHz
3400 - 3600 MHz band	0 MHz	200 MHz
3600 - 4200 MHz band	0 MHz	200 MHz
Sub total	**200 MHz**	**1020 MHz**
6 GHz and higher block		
26 GHz	0 MHz	3000 MHz
40 GHz	0 MHz	Not yet defined
66 GHz	0 MHz	Not yet defined
Sub total	**0 MHz**	**3000 MHz**
Total allocated and licensed spectrum	**320 MHz**	**4210 MHz**

Table 7 – IMT licensed spectrum and allocations

6 OTHER INDICATORS

6.1 International internet bandwidth

Domestic and international backbones are important building blocks of Internet infrastructure. The international internet bandwidth refers to the average traffic load (expressed in Mbit/s) of international subsea fiber optic cables for carrying internet traffic. The used international internet bandwidth in Curaçao over 2022 is 87.0 Gbit/s. This figure refers to the total used capacity over the fiber-optic cables connecting Curaçao to the rest of the world over a 12-month period for all operators combined. As can be shown from figure 21 below, the international bandwidth capacity for Curaçao has increased significantly over the last years.

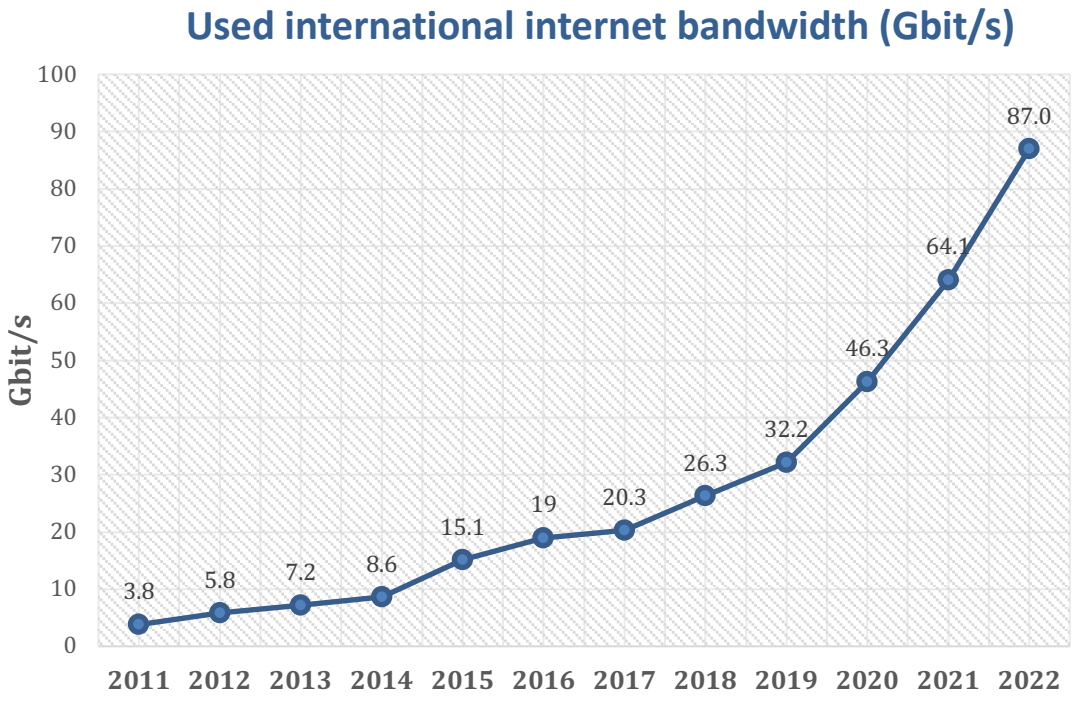


Figure 21: Used international internet bandwidth (Gbit/s), 2011-2022

The growth of international bandwidth capacity has been driven by the need to support ever growing data traffic, much of it exchanged between data centers (see chapter 6.2) and end users from across the globe. For the island of Curaçao, the vast majority of the international Internet traffic flows over optical fiber submarine cables connected to the rest of the region. For an overview of the international subsea cables connecting Curaçao to the rest of the world, refer to appendix G.

The presence of the AMS-IX Caribbean[8] Internet Exchange as one of the first and major internet exchanges in the region has also contributed in substantial ways to the development of the Internet ecosystem in Curaçao, with its interconnecting services, the overall quality and the availability of locally hosted international content (Akamai, Google, Cloudfare, etc.)

6.2 Data Centers in Curacao

Global growth in ICT usage presents significant opportunities for a local industry that is globally focused. The importance of ICT has not been diminished by the market instabilities of the last few years. Extensive usage of ICT across the whole economy continues to grow, now more than ever with the COVID-19 pandemic. Local ICT capabilities remain vital for the digital economy. A local industry that is responsive to market demand for new products and services has the potential to make a significant contribution to the economy. Data centres play a vital role in this whole ecosystem of ICTs and remote connectivity.

Curaçao has several data centers providing local and international hosting services, co-location, cloud services and disaster relief support (business continuity). These data centers are officially identified by the Government as critical infrastructures and are considered very important to support local ICT-services and the digital economy. The data centers range in category from several tier-III up to a tier-IV data center providing the highest level of security and redundancy/reliability. Refer to appendix H for a list of data centers in Curaçao.

6.3 Connected schools

As part of the education system digitalization project, the Government of Curacao and Digicel have signed an agreement for high-speed fiber-optic internet connectivity to over 100 schools, under a joint plan overseen by the Ministry of Education and Bureau Telecommunicatie en Post. The project will use Digicel's fiber-optic network to provide several levels of internet access to selected organizations that are part of the education system.

The eco-system consists of the Ministry of Education, Schoolboards, and the different schools starting at kindergarten all the way to the University. A metro ethernet network is used to connect and all entities and provide broadband internet access through a

[8] https://www.ams-ix.net/car

centralized connection at a data center. The schools are provided internet connectivity based on the number of students and the type of school, currently schools are connected at base speeds of 100Mbps, 200Mbps, 300Mbps, or 500Mbps.

The objectives of the digitalization process are centralization of information, standardization of network elements, and normalization for information, this will lead to enable a decision-making process that is based on current information. The project has the objective to improve both the administrative and educational aspects of the islands education eco-system. The project is still in its starting phase, but the following are some of the current achievements.

1. All schools have access to the internet;
2. The Ministry of Education have implemented a centralized education administrative application;
3. The Ministry has a proper insight into the IT needs of all schoolboards;
4. The Ministry is in progress with the implementation of Microsoft 365 across the education eco-system.

Future plans include:

1. Improve connectivity in all schools;
2. Provide all students with devices;
3. Improving the digital knowledge of all active in the education eco-system.

6.4 Terrestrial multichannel TV-subscriptions

The subscription television or pay-tv market on Curaçao nowadays is mainly being delivered by either cable-TV network based on a Hybrid Fiber-Coax (HFC) infrastructure using the latest DOCSIS technology or IPTV-services over Fiber to the Home (FttH) network. Satellite television is not being analyzed in this section as this is not considered to be part of regulated terrestrial cable-television services.

For the last 20 years the citizens in Curaçao were able to receive over the air cable-TV signals using outdoor antennas. This technology was very popular and is better known as Multichannel Multipoint Distribution Systems (MMDS), but nowadays it is making place for the implementation of new 5G services.

The local subscription television market in 2022 again showed a drop in comparison with the previous year as illustrated in Figure 22. For EOY 2022, the total number of terrestrial multichannel TV subscriptions is 15.2 thousand compared to 16.2 thousand the year before. This represents an overall 998 drop or 6.2% decrease in subscriptions. This trend will most likely continue for the next few years, as with the evolution of the internet, Over-the-Top (video) services and streaming applications including mobile video are gaining more and more popularity amongst end users.

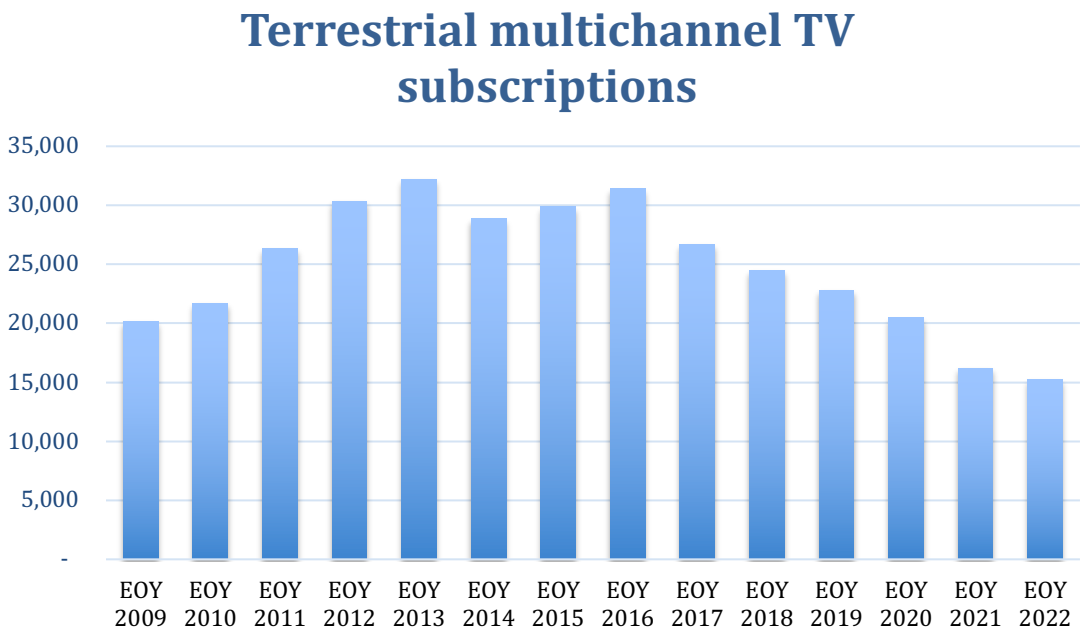


Figure 22: Terrestrial multichannel TV subscriptions, EOY 2009 – EOY 2022

6.5 Measuring progress towards the SDGs

One of the main targets of the BT&P as regulator of the telecommunications and ICT-sector is to create a well-balanced and healthy competitive environment for service providers at one hand, but then also with the necessary elements to promote availability, accessibility and affordability (universal access) of broadband internet to the whole community. A well-connected nation has much better opportunities to equally participate in the worldwide digital economy and this on its turn will realize much better overall economic developments and progress.

With the analyzed fixed- and mobile broadband internet indicators in chapters 3 and 4 - broadband coverage and penetration levels by households and individuals, available networks and services by latest technology, affordability of entry-level internet packages, number of subscriptions by speed categories, and national average download speed - it can be concluded that Curaçao is well on its way towards the United Nation's Sustainable Development Goal (SDG) number 9: "Industry, Innovation and Infra-structure".

One of the main targets is to significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet. Curaçao ranks at number 13th in terms of affordability with 3.55% of the GNI p.c. in comparison with the rest of the region for the fixed broadband entry level basket and number 15th with 1.92% of the GNI p.c. with regards to the mobile data basket. It should be noticed that high entry-level speeds for fixed broadband is a critical factor that needs the necessary attention when considering the digital divide.

Curaçao does not meet the 2% GNI affordability target for fixed broadband internet services as stipulated by the United Nations Broadband Commissions for sustainable Development but it does for the mobile data basket. So, it's important that the regulator together with the local ISP's engage in a structural approach to make affordable entry-level packages fixed broadband available for the whole community. This is the only way to guarantee digital inclusion for every citizen e-learning possibility and to for an innovative and transformational digital economy that relies on an accessible and affordable telecommunication infrastructure.

Appendix A - Trends 2013-2023 for Curaçao

Important information:

1. Telecommunication/ICT data have been obtained from replies to ITU questionnaires from operators and the national statistics office. The main source of the telecommunication/ICT data for each economy is shown in the list of sources, see Appendix D.
2. This telecommunication market report - Yearbook of Statistics has been prepared by the Bureau Telecommunicatie en Post Curaçao. Comments should be addressed to: Mr. Leonardo de Abreu Ladeira, Senior Policy and Market Regulation Advisor, Bureau Telecommunicatie en Post, Beatrixlaan 9, Willemstad, Curaçao.
3. Refer to Appendix B for definitions.
4. Information about ITU statistics is available on: http://www.itu.int/ITU-D/ict

CURAÇAO

INDICATOR	EOY 2013	EOY 2014	EOY 2015	EOY 2016	EOY 2017	EOY 2018	EOY 2019	EOY 2020	EOY 2021	EOY 2022
DEMOGRAPHY, ECONOMY										
Population	154843	156971	158969	160337	160012	158659	156223	153671	151066	148925
Households	55751	56499	57274	58010	58502	58384	61471	N/A	N/A	N/A
FIXED TELEPHONE NETWORK										
Fixed-telephone subscriptions	63715	61130	62571	59231	61709	58625	53773	47732	53095	50576
Fixed-telephone subscriptions per 100 inhabitants	41.15	38.94	39.36	36.78	38.09	36.13	32.7	28.5	27.9	
Price of a 1-minute local call, peak rate	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
Price of a call set-up charge, on-peak	0.095	0.089	0.089	0.095	0.095	0.095	0.095	0.095	0.095	0.095
Total 1-minute fixed call in USD$	0.12	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12
FIXED (WIRED) BROADBAND										
Fixed (wired) Broadband subscriptions	37000	38663	40536	42713	46120	48080	49514	51466	54213	51814
Fixed (wired) Internet Broadband subscriptions per 100 inhabitants	22.27	23.01	23.59	25.02	28.77	28.06	27.60	38.04	39.95	38.92
Fixed (wired) Broadband subscriptions by speed:										
2 to less than 10 Mbit/s					17,914	16,479	16,538	11,105	3,141	2,500 (1)
10 to less than 30 Mbit/s					21,623	15,071	18,105	17,317	6,255	5,424 (1)
30 to less than 100 Mbit/s					7,553	17,740	18,515	24,784	21,689	22,600 (1)
Equal to or above 100 Mbit/s					103	108	150	150	27,314	28,200 (1)
MOBILE-CELLULAR NETWORK										
Mobile-cellular telephone subscriptions	203502	192569	190489	186644	187184	186390	184236	172273	175034	171875
Mobile-cellular subscriptions per 100 inhabitants	131.42	122.68	119.81	116.41	116.98	117.48	117.93	112.11	115.87	115.41
Mobile population coverage by type of network:										
3G mobile network			82%	95%	100%	100%	100%	100%	100%	100%
LTE mobile network			15%	70%	70%	80%	90%	90%	100%	100%
Mobile-cellular voice network			100%	100%	100%	100%	100%	100%	100%	100%
Mobile-cellular prepaid – price of a one-minute local call (peak, on- net) in USD	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
INTERNET										
International Internet bandwidth, in Mbit/s	*7200*	*8600*	*15100*	*19000*	*20300*	*26300*	*32200*	*46300*	*64100*	*87000*
OTHER INDICATORS										
Terrestrial multichannel TV subscriptions	32212	28858	29866	*31394*	*26667*	*24489*	*22766*	*20453*	*16220*	*15222*
PERFORMANCE INDICATORS										
Average download speed, in average Kb/s for the year (See appendix C for calculations)	12895	14744	*15893*	*18760*	*21011*	*22000*	*23800*	*30700*	*45300*	*52900*

(1) Estimate.

Table 6 – Curaçao data EOY 2013 – EOY 2022

Appendix B – Definitions

INDICATOR	DEFINITION
DEMOGRAPHY, ECONOMY	The indicators in this category are useful for deriving ratios in order to make comparisons across countries. They are generally obtained from international organizations (see Sources) or national statistical offices. Readers are advised to consult the publications of the international organizations shown in Sources for precise definitions of the demographic and macro-economic data.
Population	The data for population are mid-year estimates. They typically refer to the de facto population within the present boundaries.
Households	The data for households refer to the number of housing units consisting of persons who live together or a person living alone. Estimates are based on growth rates between censuses.
FIXED TELEPHONE NETWORK	The indicators in this category refer to the fixed telephone network.
Fixed-telephone subscriptions	Fixed-telephone subscriptions refers to the sum of active number of analogue fixed-telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones. This indicator was previously called Main telephone lines in operation.
Fixed-telephone subscriptions per 100 inhabitants.	Calculated by dividing the number of fixed telephone subscriptions by the population and multiplying by 100.
Price of a three-minute local call to a fixed-telephone line, peak rate	Price of a three-minute local call (peak-rate) to a fixed-telephone line refers to the price of a three-minute peak local call from a residential fixed-telephone line, including any call set-up charges, within the same exchange area using the subscriber's own terminal (i.e. not from a public telephone). Taxes should be included.
Price of a three-minute local call to a fixed-telephone line, off-peak rate	Price of a three-minute local call to a fixed-telephone line refers to the price of a three-minute off-peak local call from a residential fixed-telephone line, including any call set-up charges, within the same exchange area using the subscriber's own terminal (i.e. not from a public telephone). Taxes should be included. If not included, it should be specified in a note including the applicable tax rate.
Price of a one-minute local call to a fixed-telephone line, peak rate	Price of a one-minute local call (peak-rate) to a fixed-telephone line refers to the price of a one-minute peak local call from a residential fixed-telephone line, excluding any call set-up charges, within the same exchange area using the subscriber's own terminal (i.e. not from a public telephone).
Price of a call set-up charge on-peak	Price of a call set-up charge.
MOBILE CELLULAR NETWORK	The indicators in this category refer to mobile cellular networks.
Mobile-cellular telephone subscriptions	Mobile-cellular telephone subscriptions refers to the number of subscriptions to a public mobile-telephone service that provide access to the PSTN using cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months). The indicator applies to all mobile-cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services.

Mobile-cellular subscriptions per 100 inhabitants	Calculated by dividing the number of mobile-cellular telephone subscriptions by the population and multiplying by 100.
Mobile-cellular prepaid – price of a one-minute local call (peak, on- net)	Refers to the price per minute of a peak prepaid call from a mobile- cellular telephone with a prepaid subscription to another subscriber in the same network. Taxes should be included. If not included, it should be specified in a note including the applicable tax rate.
Price of a one-minute local call to a mobile-cellular phone, peak rate	The price of a one-minute local call from a residential fixed-telephone line to a mobile-cellular number during peak time.
Percentage of the population covered by a mobile-cellular network	Percentage of the population covered by a mobile-cellular network refers to the percentage of inhabitants within range of a mobile-cellular signal, irrespective of whether or not they are subscribers or users. This is calculated by dividing the number of inhabitants within range of a mobile-cellular signal by the total population and multiplying by 100.
Mobile-cellular connection charge	Initial, one-time charge for a new prepaid mobile-cellular subscription. Refundable deposits should not be counted. The connection fee corresponds usually to the price charged for the subscriber identity module (SIM) card, but may include other fees. It should be noted if free minutes, free SMS or other free services are included in the connection charge.
Data-only mobile broadband 1.5 GB, price of the plan	Price (in local currency) of the base plan selected for data-only mobile-broadband basket with 1.5 GB volume of data.
Data-only mobile broadband 1.5 GB, cap, in GB	Maximum amount of Internet data, in gigabytes (GB), included in the base plan selected for data-only mobile-broadband basket with 1.5 GB volume of data.
Data-only mobile broadband 1.5 GB, price of excess usage, per GB	Price per additional gigabyte (GB) of Internet data downloaded once the allotted limit of the base plan selected for data-only mobile-broadband basket with 1.5 GB is used.
Data-only mobile broadband 1.5 GB, validity of plan (days)	Validity (in number of days) of the base plan selected for data-only mobile-broadband basket with 1.5 GB.
Data-only mobile broadband 1.5 GB, technology used	Type of technology used (e.g. UMTS, LTE) for the plan selected for data-only mobile-broadband basket with 1.5 GB.
INTERNET	The indicators in this category refer to Internet.
International Internet bandwidth, in Mbit/s	International Internet bandwidth refers to the total used capacity of international Internet bandwidth, in megabits per second (Mbit/s). It is measured as the sum of used capacity of all Internet exchanges (locations where Internet traffic is exchanged) offering international bandwidth. If capacity is asymmetric (i.e. more incoming (downlink) than outgoing (uplink) capacity), then the incoming (downlink) capacity should be provided.
Lit/equipped international bandwidth capacity, in Mbit/s	Total lit/equipped international bandwidth capacity refers to the total lit/equipped capacity of international links, namely fiber-optic cables, international radio links and satellite uplinks to orbital satellites in the end of the reference year (expressed in Mbit/s). If the traffic is asymmetric (i.e. incoming traffic and outgoing traffic is not equal), then the higher value out of the two should be provided.

FIXED (WIRED) BROADBAND BY TECHNOLOGY	The indicators in this category refer to fixed (wired)-broadband subscriptions by technology.
Fixed (wired)-broadband subscriptions	Fixed (wired)-broadband subscriptions refers to subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fibre-to-the- home/building and other fixed (wired)-broadband subscriptions. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications (including the Internet) via mobile-cellular networks and technologies listed under the wireless-broadband category.
Fixed (wired)-broadband subscriptions per 100 inhabitants.	Calculated by dividing the number of fixed (wired) broadband Internet subscriptions by the population and multiplying by 100.
Fixed (wired)-broadband monthly subscription charge	Fixed (wired)-broadband monthly subscription charge refers to the monthly charge subscription charge for fixed (wired)-broadband Internet service. Fixed (wired) broadband is considered to be any dedicated connection to the Internet at downstream speeds equal to, or greater than, 256 kbit/s. If several offers are available, preference should be given to the 256 kbit/s connection.
Fixed (wired)-broadband speed, in Mbit/s	Fixed (wired)-broadband speed, in Mbit/s refers to the advertised maximum theoretical download speed, and not speeds guaranteed to users associated with a fixed (wired)-broadband Internet monthly subscription.
256 Kbit/s to less than 2 Mbit/s subscriptions	Refers to all fixed-broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 256 Kbit/s and less than 2 Mbit/s.
2 Mbit/s to less than 10 Mbit/s subscriptions	Refers to all fixed-broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 2 Mbit/s and less than 10 Mbit/s.
10 Mbit/s to less than 30 Mbit/s subscriptions	Refers to all fixed-broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 10 Mbit/s and less than 30 Mbit/s.
- 30 Mbit/s to less than 100 Mbit/s subscriptions	Refers to all fixed-broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 30 Mbit/s and less than 100 Mbit/s.
Equal to or above 100 Mbit/s subscriptions	Refers to all fixed-broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 100 Mbit/s.
Fixed-broadband connection charge	Fixed-broadband connection charge refers to the initial, one-time charge for a new fixed-broadband Internet connection. The tariffs should represent the cheapest fixed-broadband plan on the basis of a 5 gigabyte (GB) monthly usage. Refundable deposits should not be counted.
Fixed-broadband monthly subscription charge	Fixed-broadband monthly subscription charge refers to the monthly subscription charge for fixed-broadband Internet service. Fixed broadband is considered to be any dedicated connection to the Internet at downstream speeds equal to, or greater than, 256 Kbit/s. If several offers are available, preference should be given to the cheapest meeting the criteria of the basket (e.g. on the basis of a 5 gigabyte (GB) monthly usage).
Fixed-broadband cap, in GB	Fixed-broadband cap refers to the maximum amount of Internet data, in gigabytes (GB), that can be transferred within a month, included in the fixed- broadband monthly subscription.

WIRELESS BROADAND	The indicators in this category refer to wireless broadband.
Wireless-broadband subscriptions	Wireless-broadband subscriptions refers to the sum of satellite broadband, terrestrial fixed wireless broadband and active mobile-broadband subscriptions to the public Internet.
Mobile- broadband subscriptions	Mobile-broadband subscriptions refers to the sum of standard mobile-broadband and dedicated mobile-broadband subscriptions. It covers actual subscribers, not potential subscribers, even though the latter may have broadband enabled- handsets.
Mobile-broadband subscriptions per 100 inhabitants	Calculated by dividing the number of mobile-broadband Internet subscriptions by the population and multiplying by 100.
OTHER INDICATORS	
Terrestrial multichannel TV subscriptions	Terrestrial multichannel TV subscriptions refers to the number of subscriptions to terrestrial multichannel TV such as cable TV, Internet protocol television (IPTV), digital terrestrial TV (DTT), microwave multipoint distribution systems (MMDS).
Percentage of the population covered by at least a 3G mobile network	Percentage of the population covered by at least a 3G mobile network refers to the percentage of inhabitants that are within range of at least a 3G mobile-cellular signal, irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants that are covered by at least a 3G mobile-cellular signal by the total population and multiplying by 100. It excludes people covered only by GPRS, EDGE or CDMA 1xRTT.
Percentage of the population covered by at least an LTE/WiMAX mobile network	Percentage of the population covered by at least an LTE/WiMAX mobile network refers to the percentage of inhabitants that live within range of LTE/LTE-Advanced, mobile WiMAX/Wireless MAN or other more advanced mobile-cellular networks, irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants that are covered by the previously mentioned mobile-cellular technologies by the total population and multiplying by 100. It excludes people covered only by HSPA, UMTS, EV-DO and previous 3G technologies, and also excludes fixed WiMAX coverage.

Table 7 – Definitions

Appendix C – Download speeds

YEAR AVERAGES in Kbps	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Average download speeds per year	6726.7	12895.14	14744.24	15893	*18760*	*21011*	*22110*	*238300*	*307400*	*453000*	*529000*	*680900*

MONTHLY RESULTS in Kbps	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
January	6490.05	…	10823.17	14050.00	…	…	…	…	…	31500	44160	58580
February	6633.30	…	13679.56	14200.00	…	…	…	…	…	33280	44540	56240
March	6529.43	…	14335.05	13500.00	…	…	…	…	…	35870	44660	61310
April	6603.65	12814.36	14344.65	16000.00	…	…	…	…	…	36500	44930	64530
May	6613.32	13042.97	14754.09	17000.00	…	…	…	…	…	39700	49090	71650
June	6577.46	13849.50	16106.32	17500.00	…	…	…	…	…	44370	49190	69700
July	6986.88	13095.30	15327.46	19000.00	…	…	22110.00	…	26550	42490	50700	65770
August	7846.57	13454.28	15922.03	…	…	…	…	…	28000	42310	51000	66720
September	7593.47	13176.01	16034.84	…	…	…	…	…	29050	43000	54970	64010
October	6451.46	13079.28	15801.44	…	…	…	…	…	30700	45270	52910	65330
November	5763.54	11557.14	14986.73	…	…	…	…	…	31050	45500	54410	68090
December	6631.60	11987.44	14815.57	…	…	…	…	…	29520	…	…	62850

Table 8 – Yearly and monthly download speed results

The average yearly download speed data is calculated from the yearly average of monthly results in a year until 2015. From 2016 to 2019, on estimates are made by calculating the weighted average of subscribers per speed from the Largest Market Share operator. Since 2020 the Bureau Telecommunicatie en Post started using the Ookla speedtest Intelligent analysis tool.

Notes:

- As from April 2013, Curaçao is recorded separately, so as of 2013 measurements from April to December are used for higher accuracy;
- From 2015 on, Ookla only shows graphs, no more raw data per country. The download speeds of 2015 are derived from that graph;
- From August 2015, Ookla data viewing is discontinued and therefore not available anymore;
- For the month of July 2018, the measurement of 22110.00 was reported by Ookla speed test (download).
- For the years 2020, 2021, 2022 and 2023 the most recent available information from the Ookla Speedtest Intelligent system is used at the time of publication.

Appendix D1 – List of countries and comparison data

General Statistics	Fixed-telephone subscriptions per 100 inhabitants	Fixed (wired)-broadband subscriptions per 100 inhabitants	Mobile-cellular telephone subscriptions per 100 inhabitants	Mobile broadband subscriptions per 100 inhabitants
Curaçao	**27.9**	**40.0**	**115.9**	**--- -**
Caribbean	**24.9**	**22.3**	**108.6**	**60.7**
South America	**13.6**	**16.8**	**118.3**	**84.5**
Central America	**9.8**	**10.4**	**119.6**	**62.9**
World	**11.0**	**17.0**	**110.0**	**83.0**
Developed countries	**32.0**	**36.0**	**135.0**	**131.0**
Developing	**7.0**	**13.0**	**105.0**	**74.0**
LDCs	**1.0**	**1.0**	**76.0**	**39.0**

Caribbean region	Island	Fixed-telephone subscriptions per 100 inhabitants	Fixed (wired)-broadband subscriptions per 100 inhabitants	Mobile-cellular telephone subscriptions per 100 inhabitants	Mobile broadband subscriptions per 100 inhabitants
Lesser Antilles - Leeward islands	Antigua and Barbuda	29.0	8.6	197.4	51.5
Aruba	Aruba	32.9	17.8	132.3	
Lucayan Archipelago	Bahamas	21.0	20.3	97.4	97.3
Windward islands	Barbados	43.0	36.5	112.6	67.4
Lesser Antilles - Leeward islands	British Virgin Islands	72.5	25.4	120.9	12.6
Greater Antilles	Cayman Islands	52.8	47.0	146.8	
Greater Antilles	Cuba	13.7	2.6	63.1	33.1
Curaçao	Curaçao	27.9	40.0	115.9	------
Windward islands	Dominica	10.3	19.4	85.9	67.8
Greater Antilles	Dominican Rep.	10.4	9.8	87.6	66.7
Windward islands	Grenada	20.9	24.5	81.1	76.6
Greater Antilles	Haiti	0.1	0.3	63.9	28.2
Greater Antilles	Jamaica	16.7	14.6	102.7	61.5
Greater Antilles	Puerto Rico	22.3		112.4	
Lesser Antilles - Leeward islands	Saint Kitts and Nevis	33.0	42.3	119.1	101.7
Windward islands	Saint Lucia	7.9	21.2	95.6	51.8
Windward islands	Saint Vincent and the Grenadines	11.8	23.8	94.2	93.3
Windward islands	Trinidad and Tobago	22.4	24.3	130.9	40.3
AVERAGES		**24.9**	**22.3**	**108.9**	**60.7**
South America					

	Argentina	16.8	23.2	130.5	72.9
	Bolivia	4.6	9.3	99.6	86.7
	Brazil	13.5	19.4	102.5	95.9
	Chile	12.9	22.0	136.3	110.8
	Colombia	14.7	16.4	145.7	71.4
	Ecuador	10.4	13.7	94.3	56.7
	Paraguay	3.0	10.8	119.0	69.7
	Peru	6.3	8.9	127.8	80.3
	Suriname	19.6	20.1	147.8	128.1
	Uruguay	36.1	32.3	136.9	109.1
	Venezuela	11.4	8.8	60.3	48.2
AVERAGES		**13.6**	**16.8**	**118.3**	**84.5**
Central America					
	Belize	4.7	9.0	66.0	44.2
	Costa Rica	9.8	20.5	152.0	95.2
	El Salvador	13.6	9.7	175.3	77.0
	Guatemala	13.2		125.6	17.0
	Honduras	4.5	4.1	73.6	47.6
	Nicaragua	3.0	4.4	97.1	62.8
	Panama	20.1	14.8	147.7	96.4
AVERAGES		**9.8**	**10.4**	**119.6**	**62.9**

Table 9 – List of countries and comparison data (penetration) 1 January 2022

Appendix D2 – List of countries and comparison prices 1-min call peak, on-net benchmark (USD)

Economy	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Curaçao	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**	**0.39**
Caribbean	**0.25**	**0.24**	**0.25**	**0.26**	**0.28**	**0.27**	**0.27**	**0.28**	**0.27**	**0.26**	**0.25**
Central America	**0.22**	**0.21**	**0.23**	**0.21**	**0.22**	**0.20**	**0.21**	**0.20**	**0.22**	**0.18**	**0.18**
South America	**0.24**	**0.24**	**0.23**	**0.21**	**0.17**	**0.17**	**0.19**	**0.17**	**0.14**	**0.12**	**0.10**
Caribbean	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Antigua and Barbuda	0.30	0.26	0.29	0.29	0.35	0.35		0.35	0.35	0.35	0.35
Aruba							0.41	0.44	0.44	0.44	0.44
Bahamas	0.33	0.33	0.33	0.33	0.35	0.35	0.37	0.37	0.37	0.30	0.30
Barbados	0.26	0.23	0.25	0.28	0.30	0.30	0.30	0.30	0.30	0.30	n.a.
British Virgin Islands							0.29		0.30	0.30	n.a.
Cayman Islands		0.26	0.30	0.30	0.30	0.34		0.30	0.30	0.31	0.31
Cuba	0.45	0.35	0.35	0.35	0.35	0.35	0.35		0.35	0.36	0.36
Curaçao	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Dominica	0.22	0.21	0.21	0.23	0.23	0.26	0.26	0.26	0.26	Unlim.	Unlim.
Dominican Rep.	0.20	0.18	0.18	0.17	0.17	0.16	0.16	0.15	0.14	0.00	0.00
Grenada	0.18	0.18	0.18	0.26	0.29	0.29		0.29	0.29	0.00	0.00
Haiti	0.11	0.11	0.10	0.10	0.08	0.04	0.03	0.07	0.06	0.06	0.06
Jamaica	0.12	0.10	0.09	0.09	0.10	0.06	0.05	0.05	0.06	0.07	0.07
Puerto Rico	0.11	0.11	0.11	0.11	0.25	0.25	0.25		-	Unlim.	Unlim.
Saint Kitts and Nevis	0.19	0.28	0.29	0.29	0.33	0.33		0.33	0.33	0.33	0.33
Saint Lucia	0.32	0.32	0.32	0.34	0.35	0.35	0.30	0.30	0.30	0.30	0.30
Saint Vincent and the Grenadines	0.32	0.32	0.32	0.33	0.35	0.37	0.37	0.37	0.37	0.37	0.31
Trinidad and Tobago	0.22	0.22	0.23	0.23	0.22	0.19	0.19	0.19	0.19	0.21	0.21
AVERAGES	***0.25***	***0.24***	***0.25***	***0.26***	***0.28***	***0.27***	***0.27***	***0.28***	***0.27***	***0.26***	***0.25***
Central America	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Belize	0.34	0.34	0.34	0.34	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Costa Rica	0.07	0.07	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
El Salvador	0.17	0.17	0.14	0.13	0.12	0.12	0.12	0.12	0.13	0.13	0.12
Guatemala	0.27	0.30	0.30	0.31	0.34	0.35	0.35	0.34	0.34	0.34	0.34
Honduras		0.17	0.17	0.17	0.17	0.17	0.18	0.17	0.17	0.18	0.18
Nicaragua	0.32	0.34	0.46	0.34	0.45	0.34	0.38	0.36	0.46	Unlim.	Unlim.
Panama	0.12	0.12	0.12	0.12	0.12	0.10	0.10	0.10	0.10	0.11	0.11
AVERAGES	***0.22***	***0.21***	***0.23***	***0.21***	***0.22***	***0.20***	***0.21***	***0.20***	***0.22***	***0.18***	***0.18***
South America	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Argentina	0.29	0.27	0.38	0.41	0.28	0.29	0.47	0.32	0.28	Unlim.	Unlim.
Bolivia (Plurinational State of)	0.22	0.22	0.22	0.17	0.17	0.17	0.17	0.17	0.17	0.17	n.a.

Brazil	0.61	0.53							-	Unlim.	Unlim.
Chile	0.14	0.18	0.21	0.18	0.18	0.18	0.19	0.17	0.15	0.00	0.00
Colombia	0.18	0.19	0.17	0.13	0.11	0.12	0.02	0.07	0.06	0.06	0.06
Ecuador	0.18	0.20	0.20	0.20	0.20	0.11	0.11	0.11	0.17	n.a.	n.a.
Paraguay	0.14	0.18	0.17	0.04	0.04	0.04	0.20	0.17	0.12	Unlim.	Unlim.
Peru	0.19	0.18	0.17	0.15	0.15	0.15		0.15	0.14	0.07	0.07
Suriname	0.18	0.18	0.22	0.21	0.16	0.18	0.18	0.18	0.17	0.20	0.20
Uruguay	0.32	0.32	0.31	0.26	0.27	0.28		0.21	0.18	0.18	0.18
Venezuela	0.25	0.18	0.22	0.31		0.19				n.a.	n.a.
AVERAGES	***0.24***	***0.24***	***0.23***	***0.21***	***0.17***	***0.17***	***0.19***	***0.17***	***0.14***	***0.12***	***0.10***

Table 10 – List of countries and comparison prices 1-min call peak, on-net USD

Appendix E – Sources

CBS data 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 and 2022

TELECOMMUNICATION AND INFORMATION AND COMMUNICATION TECHNOLOGIES

Data on these subjects are obtained from operators through the annual ITU questionnaire, completed by 'BTP aansluitpuntgegevens concessiehouders' and ITU publications.

A full list:

- ITU Enquete EOY 2012 - 2022 – UTS/FLOW;
- ITU Enquete EOY 2012 - 2022 – Digicel/TRES;
- ITU Enquete EOY 2012, 2013, 2014 – Scarlet;
- ITU Enquete ICT Price Basket EOY 2012 – 2022;
- Curaçao Fixed Internet Penetration Indicators, BT&P;
- BTP aansluitpuntgegevens concessiehouders 2012 - 2022;
- BTP betaaltelevisie aansluitpunt gegevens;
- ITU EYE Data: http://www.itu.int/net4/itu-d/icteye/;
- ITU Yearbook of Statistics Telecom & ICT Indicators 2005-2019;
- ITU Fact and figures Key data 2005-2022;
- ITU Measuring the Information Society 2013, 2014, 2015, 2016, 2017, 2018;
- ITU World Telecommunication/ICT Indicators (WTI) database 2016 - 2023;
- ITU Handbook for the collection of administrative data on telecommunications/ICT, 2020 edition;
- CBS: Population and Population Growth of Curaçao; www.cbs.cw ;
- CBS: Gross national income of Curaçao; www.cbs.cw ;
- World bank: World development indicators, GNI per Capita (1-7-2020), (30-7-2021), (22-12-2022) and (26-10-2023) downloaded from data.worldbank.org/indicator ;
- United Nations Development Program, Human Development report 2019;
- AMS-IX Caribbean statistics portal: https://ams-ix.net/car;
- United Nations Sustainable Development Goals (SDGs) https://sdgs.un.org/ ;
- ITU ICT Prices trends 2017 - 2022.
- Policy Brief: The affordability of ICT services 2021 – ITU;
- Global Connectivity Report 2022, 2023 – ITU;
- The State of Broadband 2022, 2023 – ITU;
- ITU DataHub: https://datahub.itu.int/;
- ITU-D Statistics portal: https://www.itu.int/itu-d/sites/statistics/;
- ITU-D Digital development Dashboard: https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx;
- ITU-D ICT Price Basket (IPB) Dashboard: https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/IPB.aspx.

AVERAGE DOWNLOAD SPEEDS

- Ookla Speedtest Intelligence analysis tool (rights acquired by BTP)

Appendix F – List of concession holders and broadband technologies

Operator	Used technologies
FLOW Columbus Communications	Fixed-Wired Broadband: Cable / HFC, Fibre-to-the-Home or Building Mobile: LTE (4G) International communication
Digicel	Fixed-Wired Broadband: Fibre-to-the-Home Wireless-broadband/mobile: LTE (4G) International communication
Terramobile	Mobile communication
Smitcoms	International communication
Flamingo TV Bonaire	International communication
Evolving Communications	International communication

Table 11 – List of operators and used broadband technology

Appendix G – List of international subsea fiber optic cables

Submarine Cable-systems landing in Curacao

1. Arcos: providing connections to Puerto Rico, the rest of the Caribbean, Venezuela and the USA;
2. ~~Americas II: providing connections to Venezuela, St. Croix and the rest of the Caribbean, including additional logical routes to Miami (USA) and Brazil;~~ (End of life reached)
3. Alonso de Ojeda: providing connection to Aruba;
4. EC-Link: providing connection to Trinidad & Tobago and Bonaire (Jerry Newton/EC-Link extension);
5. Amerigo Vespucci: providing connection to Bonaire;
6. PCCS (& Alonso de Ojeda II to Aruba): providing connections to the Caribbean, South America, and the USA.

Appendix H – List of data centers in Curaçao

E-Commerce Park Curacao

Blue NAP Americas

CORE N.V. Curacao

Digicel Curacao