

# TELECOMMUNICATIONS PERFORMANCE INDICATORS 2022

## Curacao ICT sector Benchmarking & Analysis



STATISTICAL  
PUBLICATION  
END OF YEAR 2021



**BUREAU TELECOMMUNICATIE EN POST**  
MULTI-SECTOR REGULATORY AUTHORITY

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Publication date: March 2023

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## 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 night telecommunications market report by the Bureau Telecommunicatie en Post<sup>1</sup> (from here on: BT&P) and the data is collected through an internationally standardized questionnaire organized by the International Telecommunication Union<sup>2</sup> (from here on: ITU) in combination with questions relevant to the BT&P.

The questionnaire was sent to all local telecom operators in March 2022, requesting information representing 2021, more specifically related to the date of December 31<sup>st</sup>, 2021 (from here on: End-of-Year, EOY 2021). Most of the data was received by BT&P in the third and fourth quarters of the year 2022. 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. Some of the benchmarking analysis are conducted on the previous year (EOY 2020) as the information of EOY 2021 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.

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<sup>1</sup> Multi-sector regulatory authority in Curacao. For more information visit [www.btnp.org](http://www.btnp.org).

<sup>2</sup> Visit [www.itu.int](http://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 (2022), BT&P was able to benchmark the Curaçao data against peers in the Caribbean region, South and Central America, including World 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 years. In the end of 2021, the number of fixed telephone subscriptions decreased slightly to 53.095, which is a decline of 418 subscriptions compared to the previous year, representing a 0.8 percent drop.

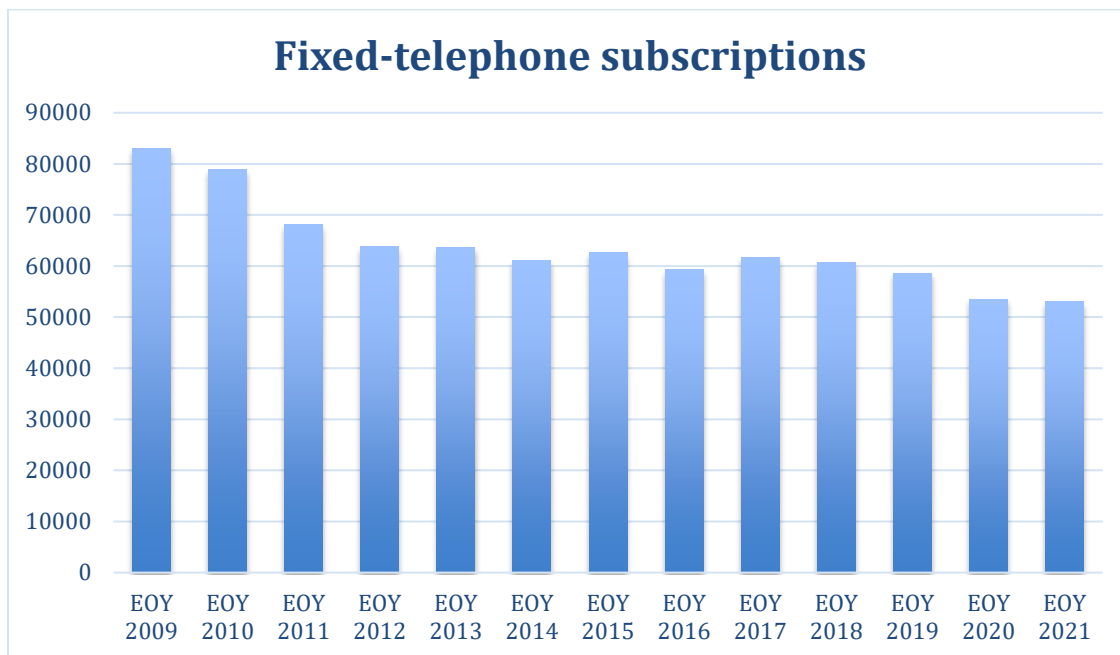


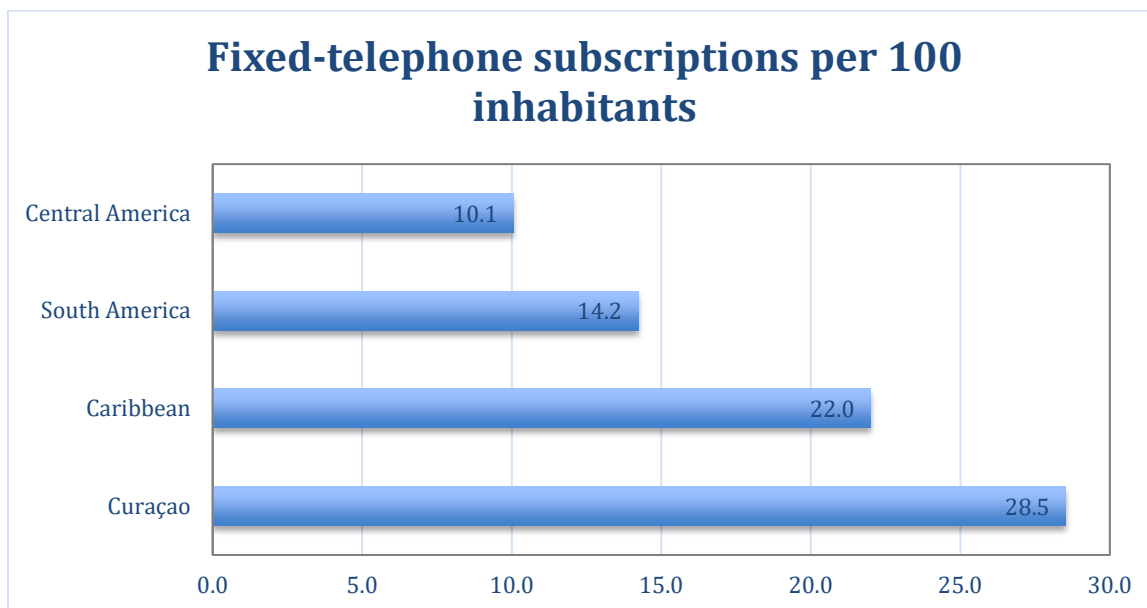
Figure 1: Fixed-telephone subscriptions, EOY 2009 - EOY 2021

The use of fixed telephone has changed considerably from 83.0 thousand in 2009 to 53.1 thousand subscriptions at the beginning of this year. 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 2019. Since EOY 2020, the number of fixed telephone subscribers fell considerably with more than 5000 subscriptions.

The total number of fixed-telephone subscribers in Curaçao has declined around 36.1 percent over the last 12-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. The EOY 2020 fixed voice penetration was calculated at 28.5. This means that in 2020 there were approximately 29 fixed voice subscriptions for 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 2020*

### 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 1<sup>st</sup> minute charges for the period 2012-2021.

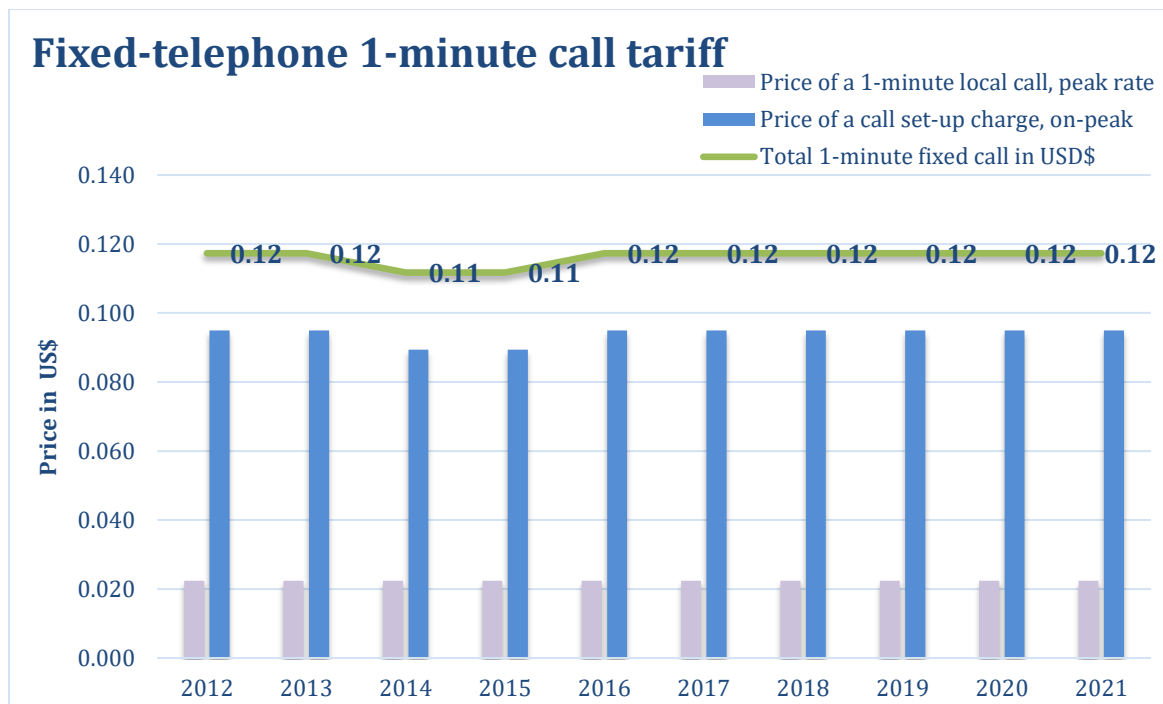


Figure 3: Fixed-telephony tariffs in USD, EOY 2012-2021

The first-minute fixed-telephone call during peak hours for the year 2021 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<sup>3</sup> subscriptions continue again to show growth in 2021. Figure 4 illustrates the figures for fixed broadband subscriptions of 54.2 thousand subscriptions end of year 2021. The growth thereby represents an increase of 5.3 percent, or an additional 2.7 thousand subscriptions compared to December 2020. 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 fixed (wired) internet penetration has reached an estimated level of 88% in EOY 2021 on terms of connected households.

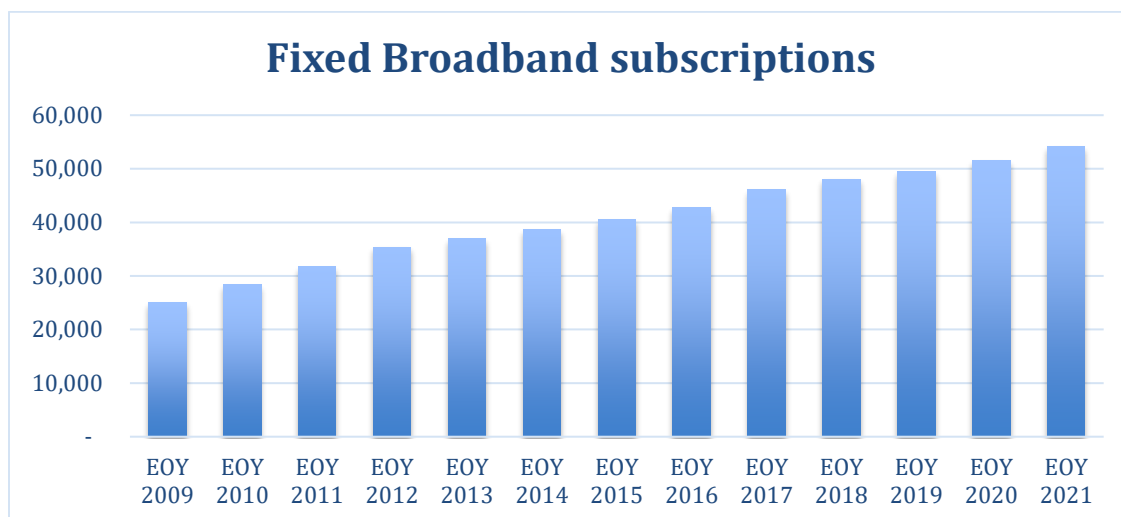


Figure 4: Fixed broadband subscriptions, EOY 2009 - EOY 2021

<sup>3</sup> 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 58.4 thousand for the EOY 2021 including enterprise connections<sup>4</sup>. The broadband speeds of 100 Mbit/s or higher represents the largest category in EOY 2021 with nearly 47% of the total connections followed by 37.1% 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 5.4% of the total connections, whereas the speeds of in between 10 - 30 Mbit/s reached 10.7%. 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.

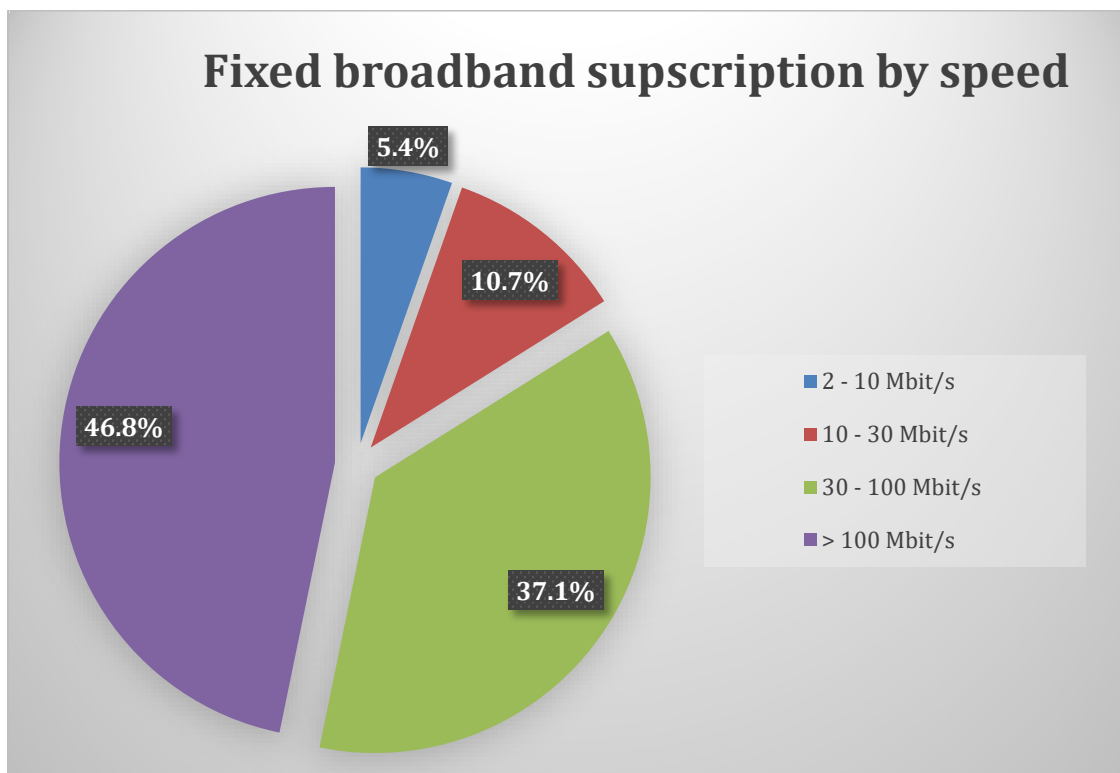


Figure 5: Fixed broadband subscriptions by speed in percentages, EOY 2021

Figure 6 below shows the development of the fixed broadband subscriptions based on speed categories from 2017 up to 2021. There's a clear development and shift in connectivity over the last year as most of the population has been upgraded by their ISPs to newly offered speeds of 100 Mbit/s.

<sup>4</sup> The exact number of registered enterprise connections sums up to 6.145 connections so there's a slight mismatch when counting the "subscription by speed" categories and comparing this with the total amount of subscriptions.

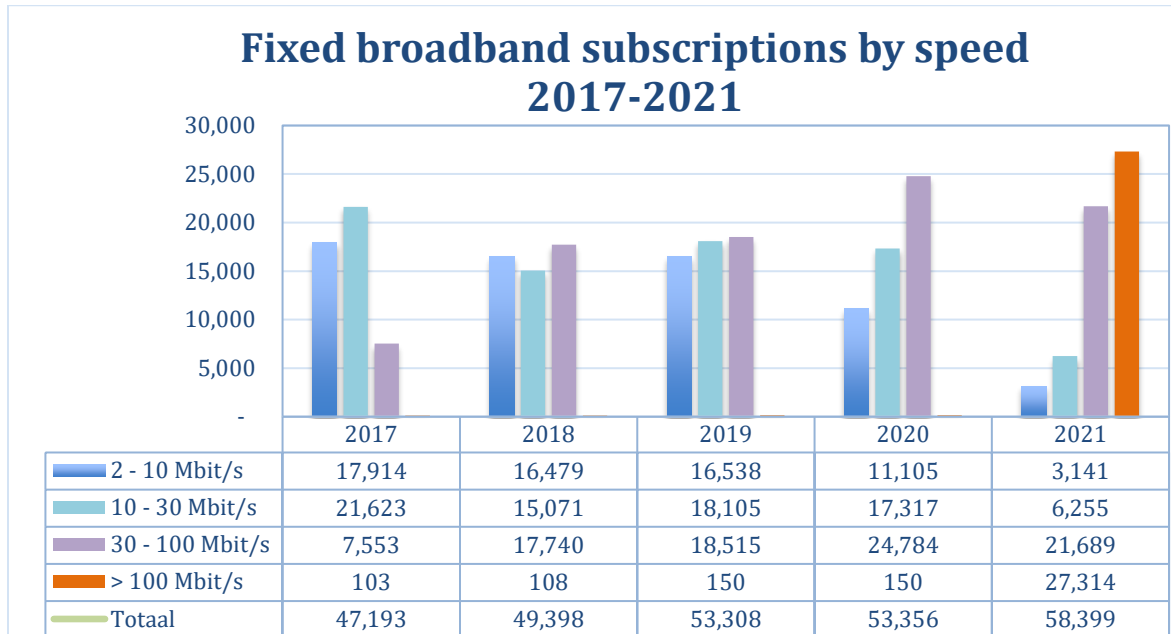


Figure 6: Fixed (wired) broadband subscriptions by speed, EOY 2017-2021

An international benchmarking based on entry-level fixed-broadband average speeds shows that Curaçao with 100 Mbit/s in EOY 2021 is well above the average of the Caribbean, Central- and South America. The average entry-level fixed-broadband speeds is 131.0 Mbit/s for Europe countries and 110 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.

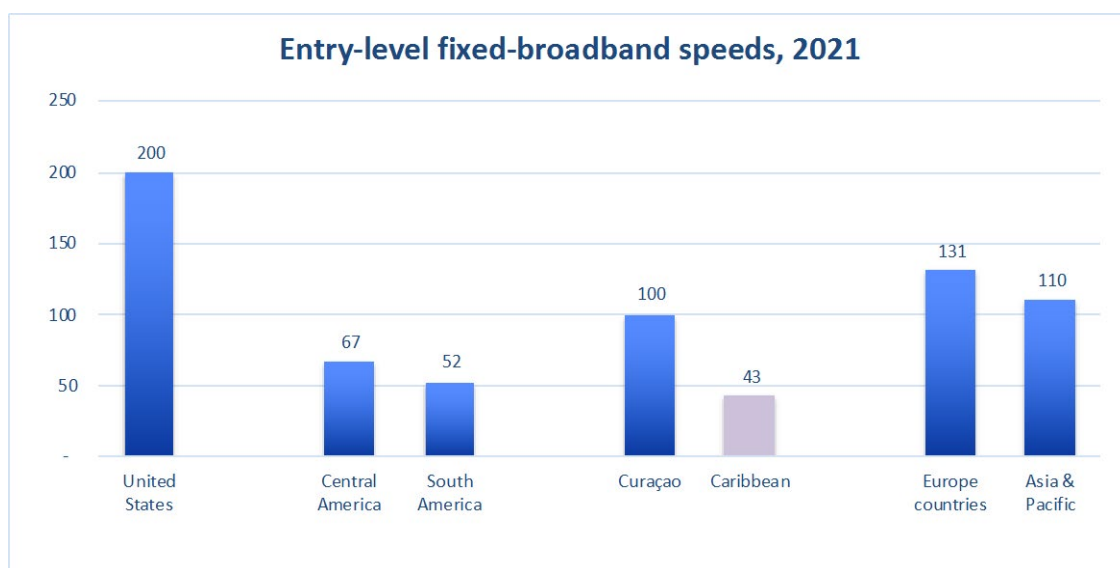


Figure 7: Entry-level fixed-broadband median speeds, EOY 2021

### 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 amount 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 2020, Curaçao had a fixed broadband penetration of 38.0 in terms of population. This implies that there were approximately 38 fixed Internet subscriptions for every 100 inhabitants in Curaçao. In comparison with EOY 2019, there is an increase of 5% 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 internet services over 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 also higher than the average of developed countries.

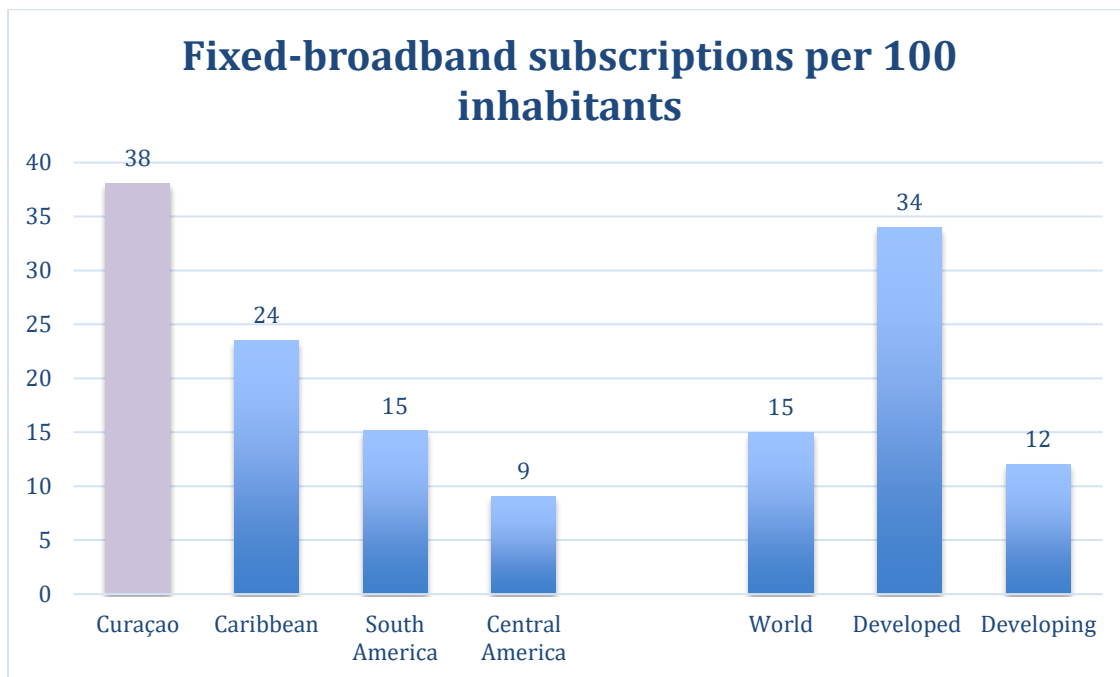


Figure 8: Fixed Broadband subscriptions per 100 inhabitants, EOY 2020

### 4.3.2 Curaçao fixed-broadband subscription per 100 inhabitants compared to the region, 2012-2020

In this section a comparison is made of the fixed broadband subscription per 100 inhabitants between Curaçao, Caribbean, and Central- and South America over the last 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.

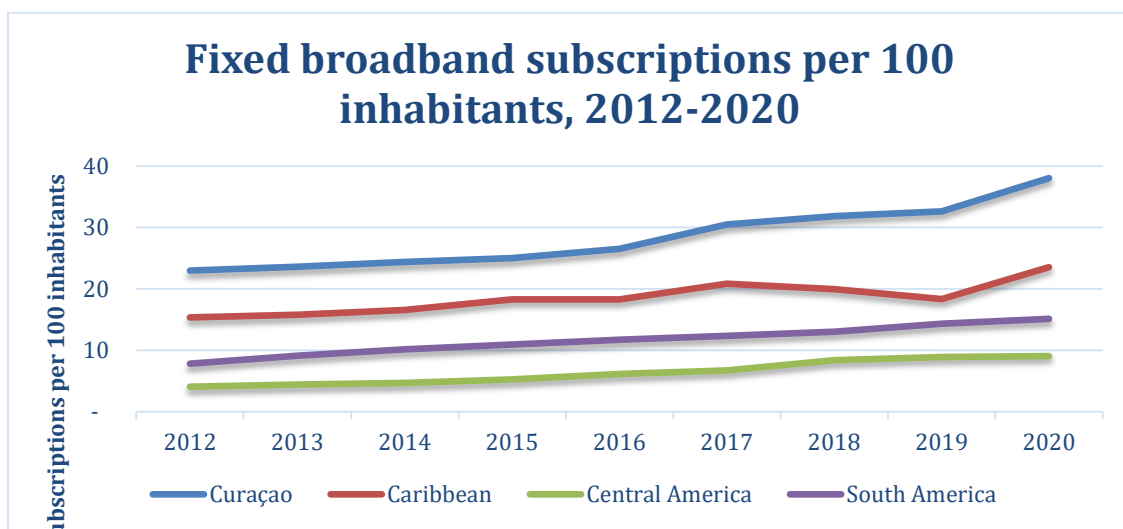


Figure 9: Fixed Broadband subscriptions per 100 inhabitants, EOY 2012- EOY 2020

### 4.3.3 List of regional broadband penetration levels

Compared to the list of broadband internet subscription per 100 inhabitants for the Caribbean region, South- and Central America in 2020, Curaçao stands at second place with a 38.04% internet penetration level. In 2019 Curaçao was also ranked in the second place with a penetration level of 32.61 per 100 inhabitants. In 2018 Curaçao was ranked in the first place with a penetration level of 31.85 per 100 inhabitants. That was the first time in history that Curaçao ranked at number 1, surpassing Barbados that has been leading for the last previous years. For the year 2020, the penetration levels in Curaçao experienced an increase of 5.43%, while Barbados took a sharp increase from 37.21 to 45.60 placing them again at the first place.

Rank	Economy	Fixed (wired) Broadband subscriptions per 100 inhabitants
1	Barbados	45.60
2	<b>Curaçao</b>	<b>38.04</b>
3	Uruguay	31.02
4	Grenada	25.88
5	Trinidad and Tobago	24.82
6	Saint Vincent and the Grenadines	23.64
7	Dominica	22.22
8	British Virgin Islands	21.80
9	Argentina	21.25
10	Puerto Rico	20.52
11	Bahamas	20.42
12	Chile	19.50
13	Costa Rica	19.38
14	Saint Lucia	18.41
15	Aruba	17.83
16	Brazil	17.05
17	Colombia	15.25
18	Suriname	15.20
19	Panama	13.83
20	Jamaica	13.67
21	Ecuador	13.48
22	Dominican Rep.	9.38
23	El Salvador	9.31
24	Belize	9.12
25	Venezuela	8.99
26	Antigua and Barbuda	8.63
27	Paraguay	8.50
28	Peru	8.30

Selected Countries		
-	Netherlands	43.16
-	Malta	41.41
-	United States	36.09
-	Singapore	25.55

*Table 1 - List of broadband penetration in the Caribbean region 2020*

#### 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 2021, 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 monthly price for entry-level fixed-broadband in the Caribbean of approximately USD 48.-. The average price in Central- and South America is lower, at USD 32.- and USD 22.- 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).

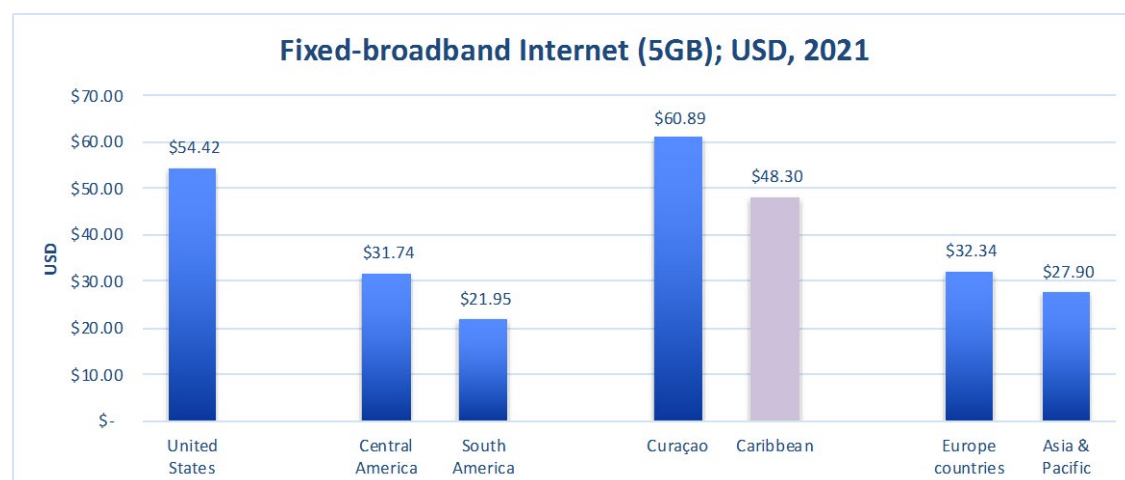


Figure 10: Fixed-broadband internet benchmark in USD, EOY 2021

#### 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 18.430 USD is collected through The World Bank, World Development Indicators database (22 December 2022) using the latest available information as from 2021. Therefore, the entry-level broadband plan in 2021 comes at 3.56% of the GNI per capita in Curaçao, which is clearly above the United Nations Broadband Commission for Sustainable Development 2025 target<sup>5</sup> 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 11 in terms of fixed broadband affordability compared to other 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.

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<sup>5</sup> <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, 2021
1	Puerto Rico	1.48	26.75	1.00	11.50	22,580
2	Bahamas	1.66	38.07	20.00	12.00	26,490
3	Costa Rica	1.78	16.09	1.00	13.00	12,310
4	Chile	2.51	29.36	300.00	19.00	14,780
5	Uruguay	2.54	29.62	3.00	22.00	16,080
6	Aruba	2.58	60.72	150.00	3.50	29,390
7	Dominican Rep.	3.18	18.13	5.00	30.00	8,100
8	Trinidad and Tobago	3.21	40.70	100.00	12.50	15,000
9	Saint Kitts and Nevis	3.30	47.23	25.00	17.00	18,820
10	Brazil	3.49	18.89	50.00	38.40	7,740
<b>11</b>	<b>Curaçao</b>	<b>3.56</b>	<b>60.89</b>	<b>100.00</b>	<b>6.00</b>	<b>18,430</b>
12	Peru	3.64	16.58	30.00	n.a.	6,460
13	Barbados	4.08	49.50	100.00	n.a.	16,900
14	Colombia	4.41	19.18	30.00	0.00	6,190
15	Argentina	4.82	24.75	25.00	21.00	9,960
16	Suriname	4.86	13.54	5.00	8.00	4,410
17	Antigua and Barbuda	5.01	59.26	10.00	n.a.	15,780
18	Ecuador	5.08	23.41	5.00	12.00	5,960
19	Saint Lucia	5.08	37.04	25.00	12.50	9,520
20	Paraguay	5.18	21.13	60.00	10.00	5,740
21	Panama	5.71	54.57	400.00	7.00	13,920
22	Grenada	6.09	44.44	50.00	n.a.	8,590
23	Dominica	6.28	35.19	15.00	15.00	7,790
24	Guatemala	7.19	27.06	10.00	12.00	4,940
25	Saint Vincent and the Grenadines	7.29	44.44	50.00	16.00	8,720
26	Jamaica	7.90	27.92	2.00	15.00	5,190
27	Bolivia	8.91	23.01	15.00	13.00	3,290
28	El Salvador	9.86	30.00	20.00	n.a.	4,260
29	Belize	10.26	34.50	10.00	12.50	6,070
30	Honduras	15.27	28.00	10.00	15.00	2,490

Selected Countries						
-	Singapore	0.78	35.20	1024.00	7.00	64,010
-	United States	1.01	54.42	200.00	8.88	70,930
-	Malta	1.08	24.10	30.00	18.00	30,760
-	Netherlands	1.41	63.91	75.00	21.00	55,200

Table 2 - Affordability of fixed broadband basket 2021

#### 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 2021 and 2022. In 2022 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 during and after 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 their Internet Service provider. In this period the ISP's also started offering higher connection speeds against more affordable prices. Existing internet packages were doubled in speed for the same price and entry-level packages were driven up towards 100 Mbps.

In 2021, the estimated average download speed recorded was approximately 45.30 Mbit/s. In November of 2022 the national average download speed was higher at 52.90 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 52.90 Mbit/s, the most developed countries in the world are showing average national download speeds of around 100 to 200 Mbit/s and up.

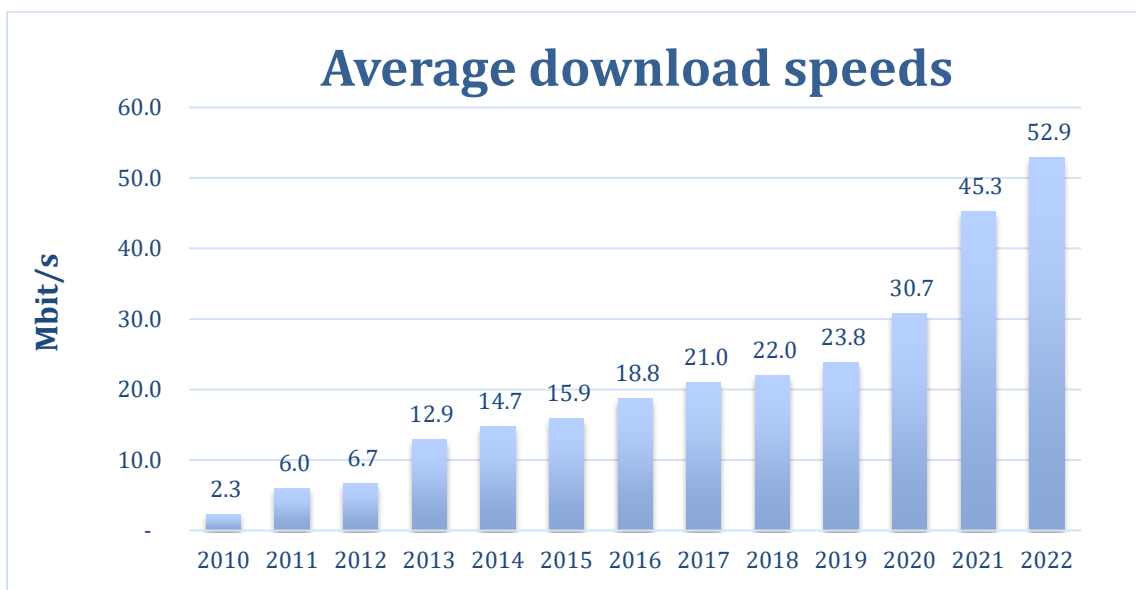


Figure 11: Average download speeds, 2010 – 2022

## 5 MOBILE-CELLULAR NETWORK

### 5.1 Mobile-cellular-voice telephone subscriptions

Over the past years the mobile market experienced an overall downward trend in terms of number of subscriptions. Since 2010 the total number of mobile subscriptions declined with a total amount of approximately 36.0 thousand subscriptions from 204.0 thousand to 168.0 thousand in EOY 2021, representing an overall 17.7% decrease in the mobile market. A more detailed explanation of the drop in the total number of mobile subscribers will be given in the following sections of this chapter.

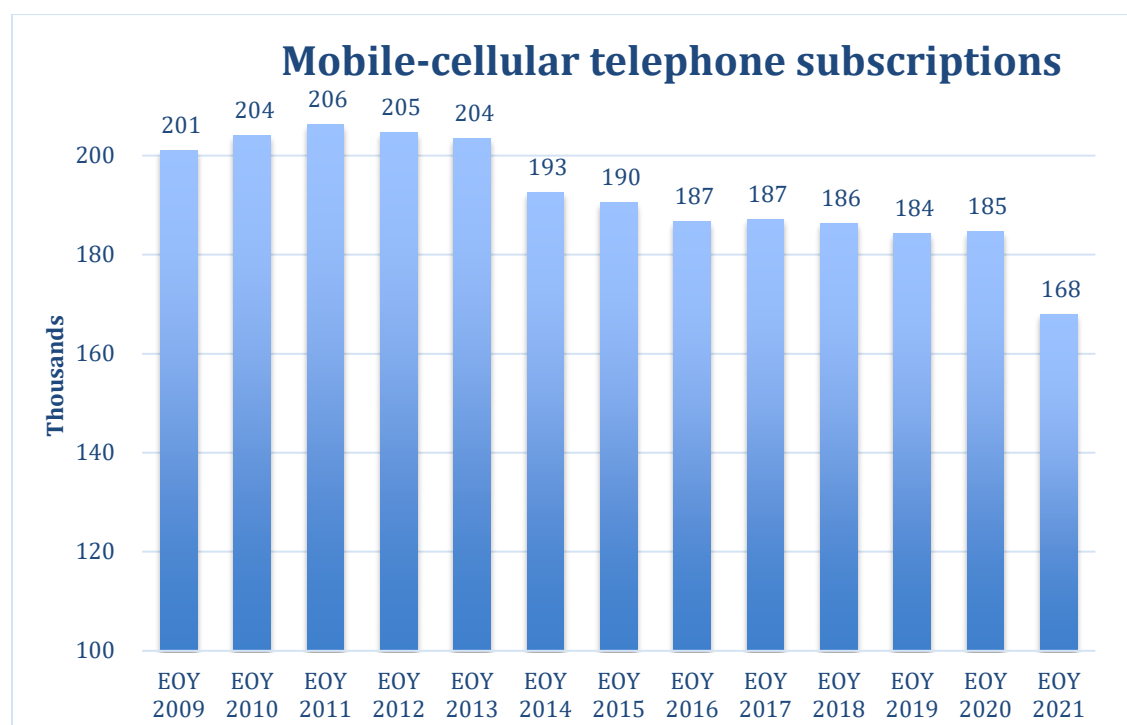


Figure 12: Mobile-cellular telephone subscriptions, EOY 2009 – EOY 2021

### 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 2020, the mobile penetration rate in Curaçao was 120. This means that there were approximately 120 mobile-cellular-voice subscriptions per 100 inhabitants in at the end of 2020. 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.

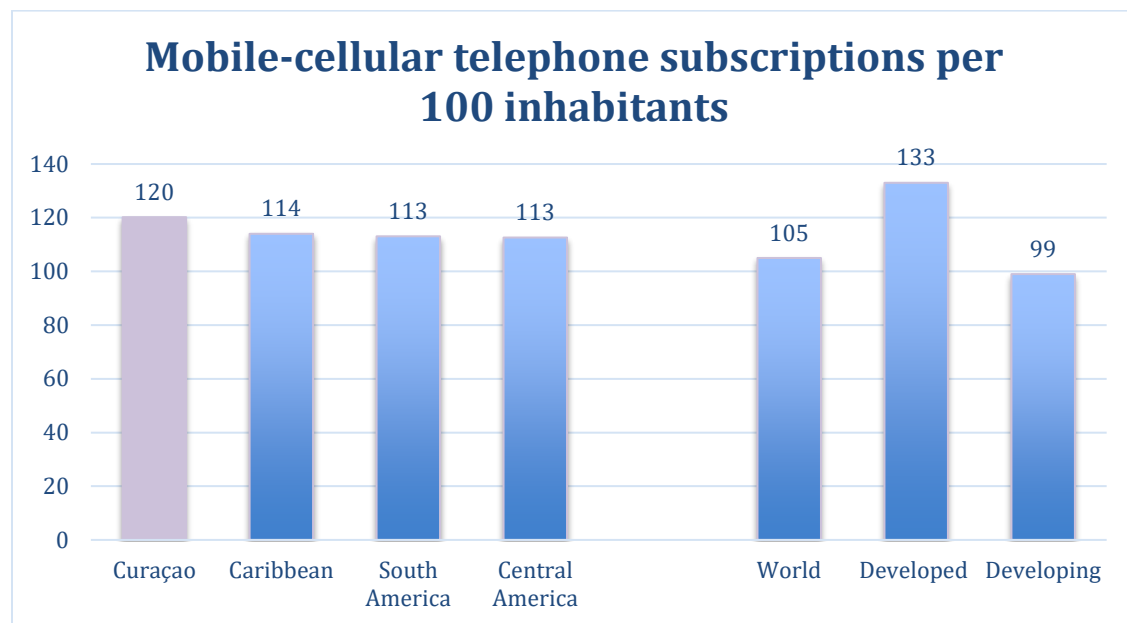


Figure 13: Mobile-cellular voice subscriptions per 100 inhabitants, EOY 2020

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 2021. 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 has 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.

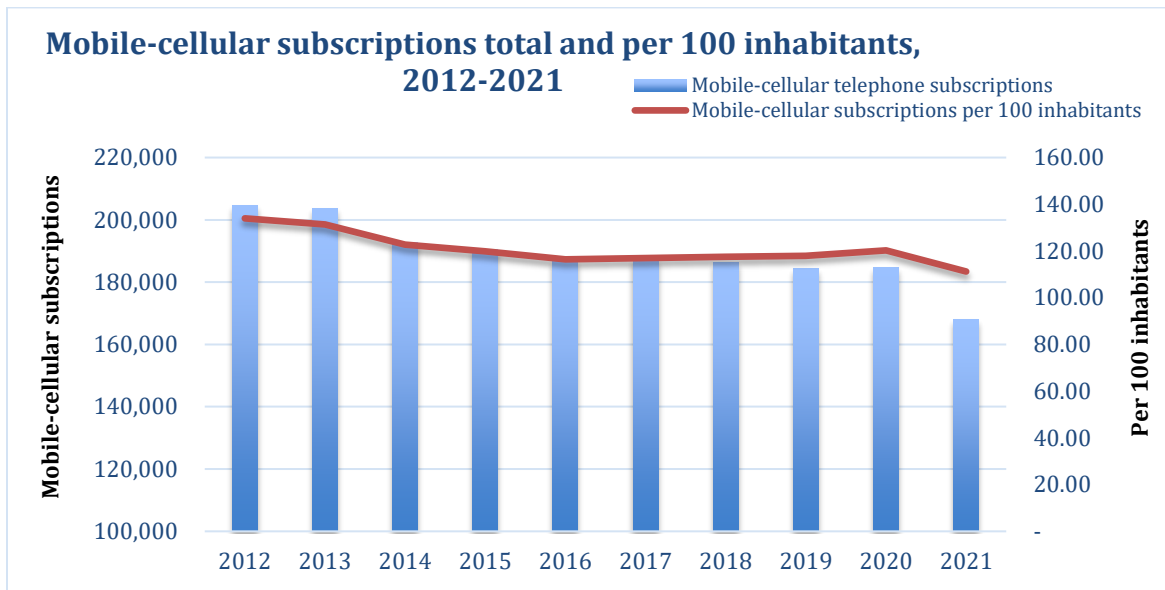


Figure 14: Mobile-cellular subscriptions total and per 100 inhabitants, EOY 2012- 2021

### 5.2.2 Curaçao mobile-cellular-voice subscription per 100 inhabitants compared to the region, 2012-2020

The figure below gives an indication of the rate for mobile-cellular-voice subscriptions per 100 inhabitants over the period 2012 to 2020 between Curaçao, the Caribbean, Central- and South America. We can clearly see an overall decreasing trend over the last few years but still with penetration levels of above 100%. As explained before, 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.

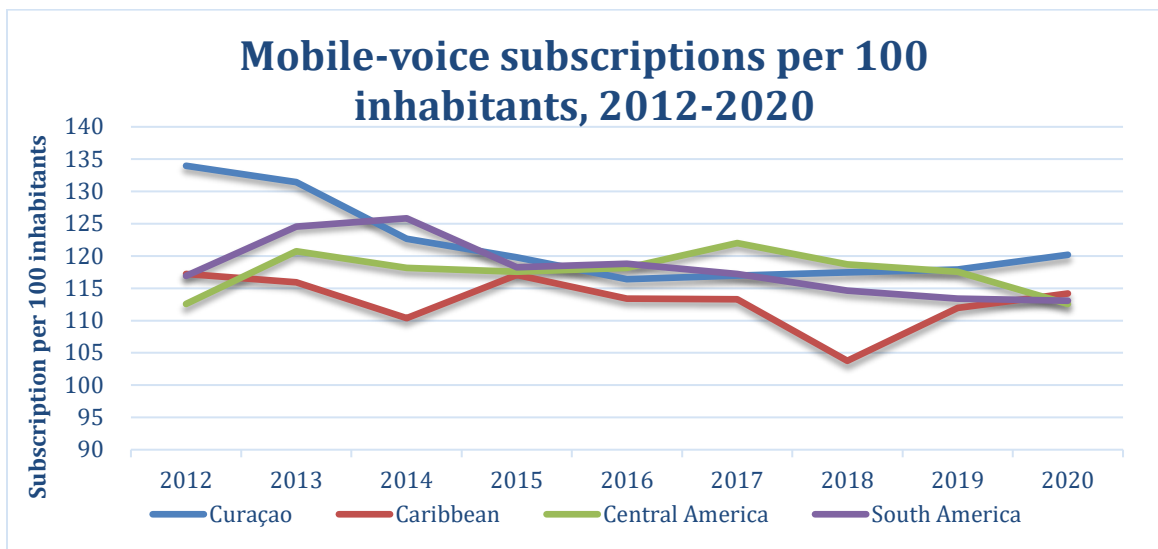


Figure 15: Mobile-cellular-voice subscriptions per 100 inhabitants, EOY 2012-2020

### 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 120.20, for which it is ranked at the 12<sup>th</sup> place in EOY 2020, 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 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 2019
1	Antigua and Barbuda	198.57	-
2	El Salvador	158.10	2
3	Suriname	148.15	4
4	Costa Rica	146.64	1
5	Panama	142.25	6
6	Colombia	132.87	8
7	Uruguay	132.73	5
8	Aruba	132.29	-
9	Trinidad and Tobago	130.95	3
10	Chile	129.89	7
11	Argentina	121.60	10
<b>12</b>	<b>Curaçao</b>	<b>120.20</b>	<b>14</b>
13	Paraguay	118.83	15
14	Peru	118.18	-
15	Guatemala	117.44	11
16	Bahamas	114.65	16
17	British Virgin Islands	113.76	9
18	Saint Lucia	113.26	-
19	Puerto Rico	106.82	12
20	Dominica	105.56	-
21	Barbados	105.10	13
22	Jamaica	101.87	17
23	Bolivia	98.90	18
24	Grenada	98.66	-
25	Brazil	96.55	19
26	Saint Vincent and the Grenadines	92.76	20
27	Nicaragua	88.25	22
28	Ecuador	88.04	21

Selected Countries		
-	Singapore	142.89
-	Qatar	137.61
-	Malta	122.85
-	Netherlands	122.83
-	Singapore	142.89

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

### 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 broadband in terms of network coverage by type of technology and related advancements over the last years including average download speeds. 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 combined real average download speeds of 57.82 Mbps and average upload speeds of 13.65 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 six 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.

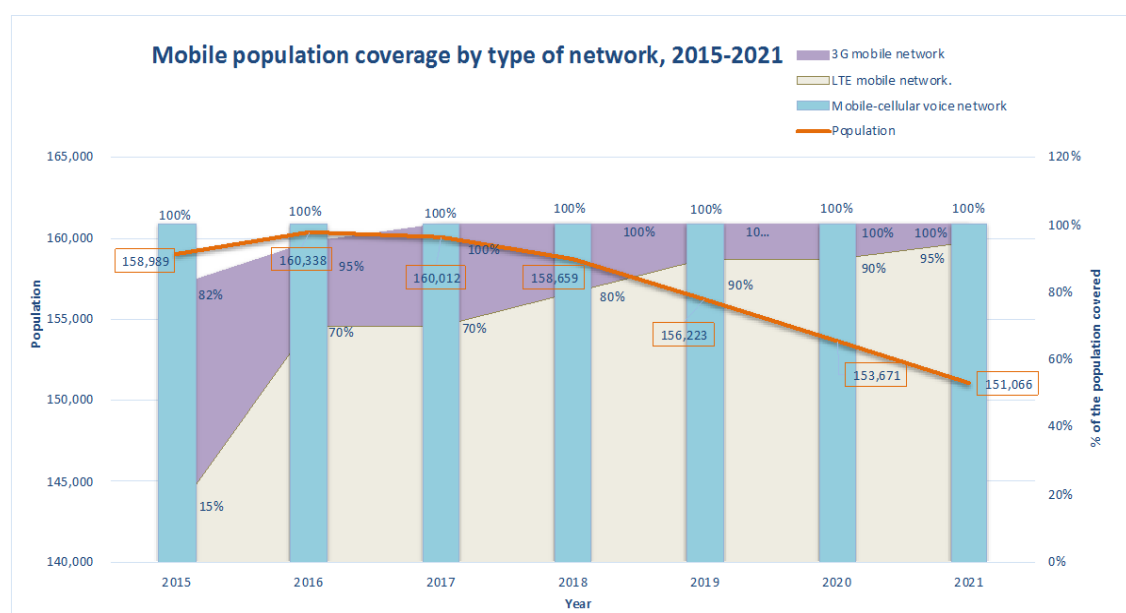


Figure 16: Mobile coverage by type of network

## 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 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.

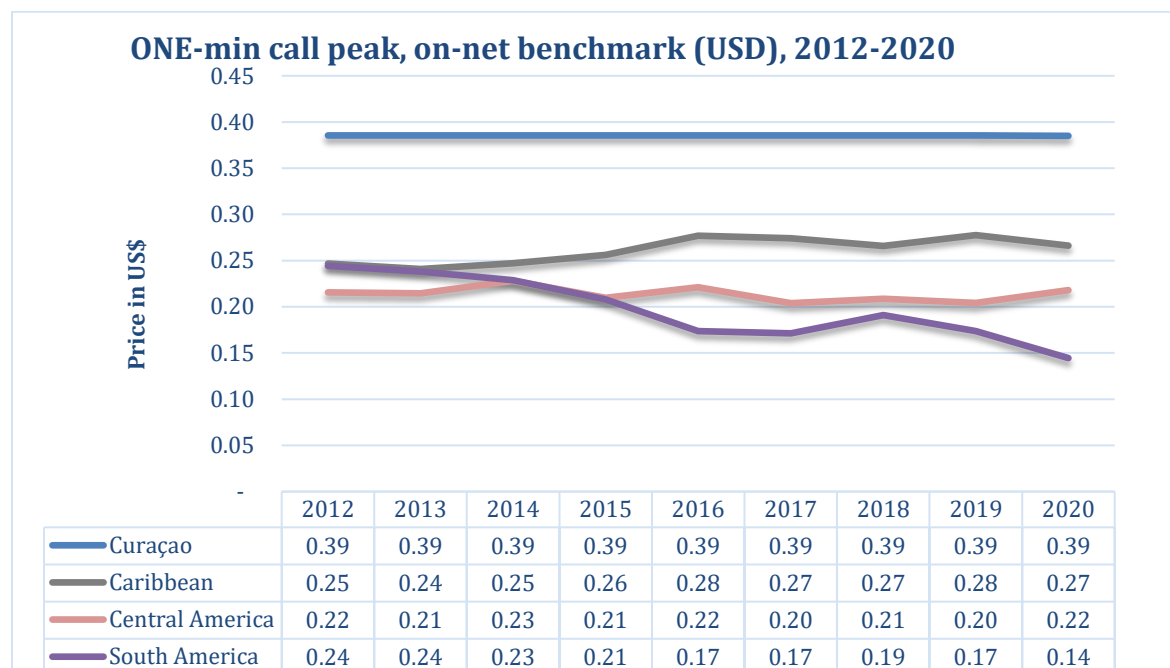


Figure 17: Mobile-cellular price of 1-min peak call, on-net, compared to the region, 2012-2020

### 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 has taken notice that the ITU conducted a miscalculation on this price basket for Curaçao in their most recent benchmarking. For this reason, we maintained the information as for EOY 2020 in this section.

The calculated mobile-cellular-voice basket in Curaçao for EOY 2020 is USD 32. As shown in figure 18 below, this is much higher when compared to the Caribbean, Central and South America, and the World average. The average price of the mobile-cellular-voice basket in the Caribbean is USD 22 which is USD 10 cheaper than the price in Curaçao.

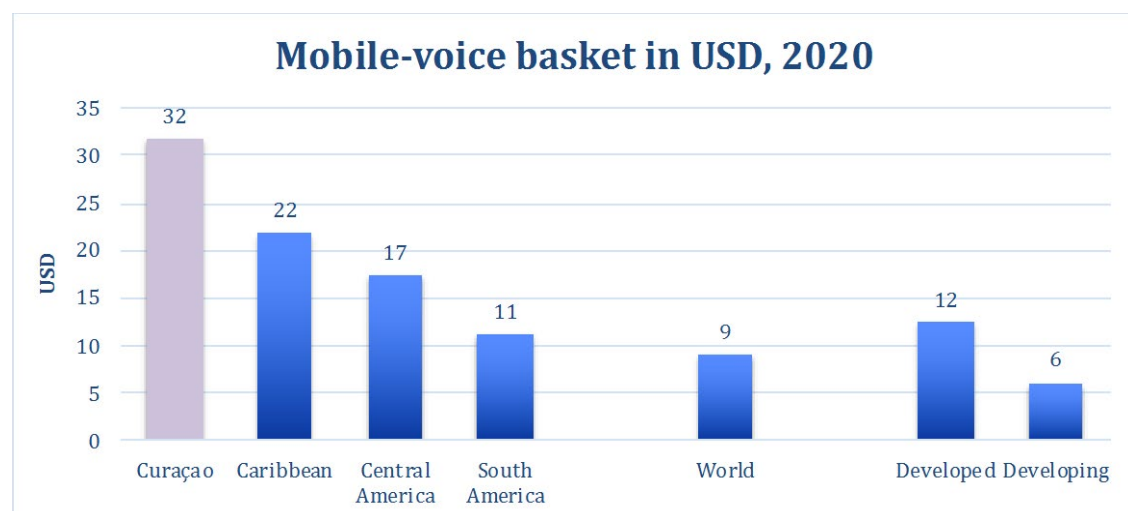


Figure 18: Mobile-cellular-voice basket in USD, EOY 2018 - 2020

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 below gives an overview of this analysis and benchmark for the region. Curaçao ranks at 12<sup>th</sup> place with a mobile-voice-basket of 1.87 percent of the GNI p.c.

Rank	Economy	as % of GNI p.c.	USD	Tax rate %	GNI p.c. USD.
1	Costa Rica	0.52	4.96	13.00	11,460
2	Panama	0.85	8.40	7.00	11,880
3	Bahamas	0.86	19.94	12.00	27,780
4	Uruguay	0.96	12.69		15,830
5	Chile	1.04	11.72		13,470
6	Brazil	1.14	7.43	40.15	7,850
7	Trinidad and Tobago	1.15	14.74	12.50	15,410
8	Colombia	1.16	5.58	23.00	5,780
9	Jamaica	1.17	4.49	25.00	4,620
10	Saint Kitts and Nevis	1.69	24.56		17,400
11	Dominican Rep.	1.78	10.75	30.00	7,260
<b>12</b>	<b>Curaçao</b>	<b>1.87</b>	<b>31.80</b>	<b>6.00</b>	<b>20,370</b>
13	Paraguay	2.10	9.00	10.00	5,140
14	Peru	2.13	10.66		6,010
15	Puerto Rico	2.15	39.03	11.50	21,740
16	Barbados	2.21	26.61	21.00	14,460
17	Antigua and Barbuda	2.22	26.33		14,250
18	Argentina	2.72	20.21	26.26	8,930
19	Suriname	2.78	12.77	8.00	5,510
20	Ecuador	2.84	13.10	12.00	5,530
21	Grenada	3.06	22.26		8,740
22	Saint Lucia	3.13	22.96	12.50	8,790
23	Bolivia	3.52	9.39	13.00	3,200
24	El Salvador	3.65	11.10	18.00	3,650
25	Dominica	3.88	22.20	15.00	6,870
26	Haiti	4.25	4.43	10.00	1,250
27	Saint Vincent and the Grenadines	4.49	27.44	16.00	7,340
28	Belize	6.56	21.70	12.50	3,970
29	Guatemala	7.00	26.20	12.00	4,490
30	Honduras	8.37	15.35	15.00	2,200
31	Nicaragua	22.38	34.50	15.00	1,850
32	Aruba	-	26.50		-
Selected Countries					
-	Malta	0.54	11.34	18.00	25,370
-	Mexico	0.48	3.37	16.00	8,480
-	Qatar	0.29	13.68	0.00	56,210
-	Singapore	0.39	17.94	7.00	54,920

Table 4 - Mobile-voice basket, 2020

### 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 eight years (in NAFs). 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. There's also clear a different market approach from both mobile operators to be recognized with one offering larger amount of data for a higher price range versus the other offering lowering packages.

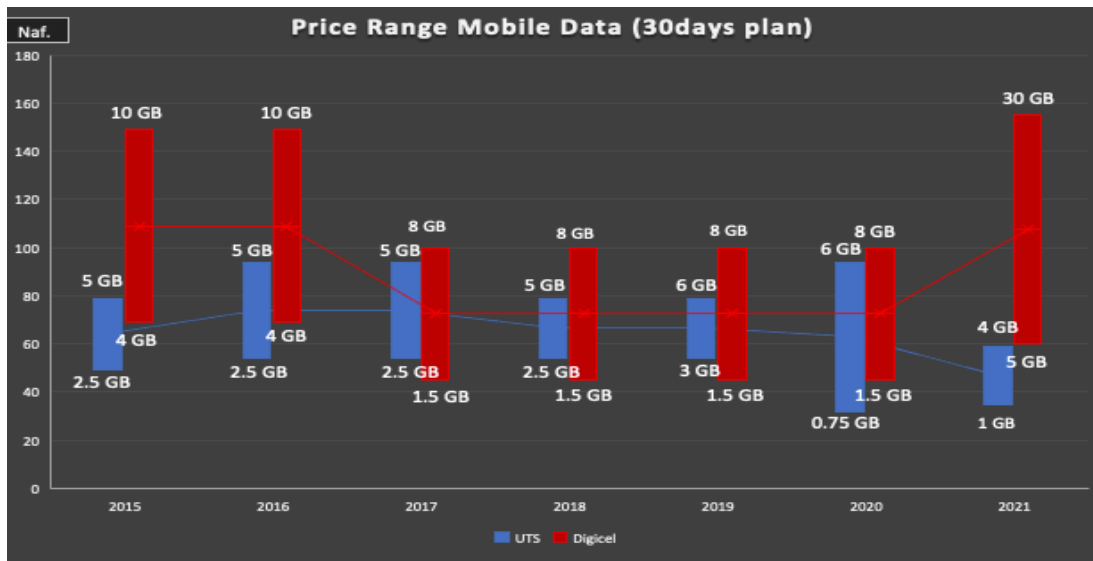


Figure 19: Prices of mobile broadband packages in Naf, 2015 - 2022

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 overall benchmarking results with the Americas region, Europe, and Asia & pacific countries. In December 2021, the price for an entry-level mobile-broadband internet service in Curaçao was 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.

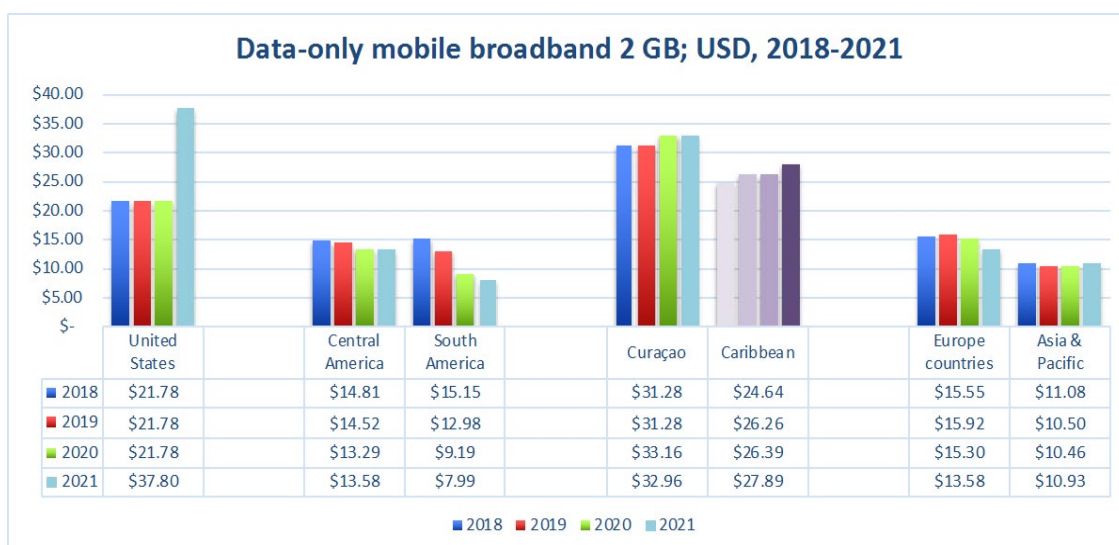


Figure 20: Mobile broadband internet (2 GB) benchmark in USD, EOY 2018- 2021

#### 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 11<sup>th</sup> place with a result of 1.93% of the GNI p.c.

Rank	Economy	as % of GNI p.c.	Price USD	Monthly data allowance (in GB)	Tech-nology	Tax rate included %	GNI p.c., USD, 2021
1	Chile	0.48	5.59	4.00	4G	n.a.	14,780
2	Brazil	0.63	3.40	2.00	LTE	38.38	7,740
3	Bahamas	0.68	15.70	2.20	LTE	12.00	26,490
4	Costa Rica	0.71	8.64	2.00	LTE	25.00	12,310
5	Uruguay	0.97	11.28	3.00	4G		16,080
6	Aruba	1.16	27.37	8.00	LTE		29,390
7	Argentina	1.39	7.13	4.00	4G	26.00	9,960
8	Peru	1.74	7.91	3.50	4G		6,460
9	Puerto Rico	1.85	33.45	5.00	LTE	11.50	22,580
10	Colombia	1.86	8.12	6.50	LTE	19.00	6,190
<b>11</b>	<b>Curaçao</b>	<b>1.93</b>	<b>32.96</b>	<b>4.00</b>	<b>4G LTE</b>	<b>6.00</b>	<b>18,430</b>
12	Panama	2.09	20.00	Unlimited	LTE	7.00	13,920
13	Ecuador	2.17	10.00	7.00	LTE	12.00	5,960
14	Paraguay	2.28	9.30	2.70	LTE	10.00	5,740
15	Dominican Rep.	2.58	14.71	30.00	LTE	30.00	8,100
16	Saint Kitts and Nevis	2.59	37.04	10.00	4G		18,820
17	Trinidad and Tobago	2.61	33.13	10.00	LTE	12.50	15,000
18	Barbados	2.63	31.75	6.00	LTE	21.00	16,900
19	Bolivia	2.80	7.24	5.00	LTE	16.00	3,290
20	Antigua and Barbuda	3.13	37.04	7.00	4G		15,780
21	Guatemala	3.40	12.82	8.00	LTE	12.00	4,940
22	Jamaica	3.58	12.64	3.00	LTE	25.00	5,190
23	Suriname	3.58	9.96	4.00	LTE	8.00	4,410
24	Saint Lucia	4.06	29.59	10.00	LTE		9,520
25	Belize	4.18	14.06	4.50	4G	12.00	6,070
26	El Salvador	4.93	15.00	20.00	4G		4,260
27	Grenada	5.08	37.04	12.00	LTE		8,590
28	Dominica	5.62	31.48	20.00	4G/LTE		7,790
29	Saint Vincent & Grenadines	6.07	37.04	12.00	4G	16.00	8,720
30	Nicaragua	6.61	10.03	15.00	LTE	15.00	1,950

Selected Countries							
-	Singapore	0.22	9.76	2.50	LTE	7.00	64,010
-	Qatar	0.40	16.48	3.50	LTE Advanced	0.00	62,310
-	Netherlands	0.51	22.91	2.00	4G	21.00	55,200
-	Malta	0.54	12.05	5.00	4.5G	18.00	30,760

*Table 5 – Mobile-data basket, 2021*

#### 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 a low and high consumption basket. The two identified categories are defined 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.

For the purpose of this report only the information of the high consumption basket is further analyzed. The BT&P has chosen this category, as this information is more relevant and represents better the reality of the local market. The price basket for EOY 2021 that combines the high-consumption of data, voice and SMS has been collected by the BT&P and 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 results for the region. Curaçao positions itself at the 15<sup>th</sup> place with a mobile data and high voice-consumption basket of 3.13 percent of the GNI p.c.

Rank	Economy	as % of GNI p.c.	Price USD	Monthly allowance			Tax rate included %	GNI p.c., USD, 2021
				voice (in minutes)	SMS	Data (in GB)		
1	Chile	0.67	7.83	150.00	80.00	4.00		14,780
2	Brazil	1.05	5.66	Unlimited	Unlimited	6.00	38.00	7,740
3	Bahamas	1.39	31.92	240.00	70.00	2.50	12.00	26,490
4	Uruguay	1.41	16.52	167.00	Unlimited	2.00		16,080
5	Aruba	1.42	33.52	1000.00	100.00	9.00		29,390
6	Costa Rica	1.69	15.21	140.00	70.00	2.00	13.00	12,310
7	Peru	1.74	7.91	Unlimited	Unlimited	3.50		6,460
8	Puerto Rico	1.85	33.45	Unlimited	Unlimited	5.00	11.50	22,580
9	Colombia	1.86	8.12	Unlimited	Unlimited	6.50	23.00	6,190
10	Panama	2.09	20.00	Unlimited	Unlimited	5.00	7.00	13,920
11	Saint Kitts and Nevis	2.59	37.04	1000.00	1000.00	10.00		18,820
12	Trinidad and Tobago	2.61	33.13	Unlimited	Unlimited	10.00	12.50	15,000
13	Paraguay	2.96	12.08	Unlimited	100.00	3.00	10.00	5,740
14	Antigua and Barbuda	3.13	37.04	700.00	700.00	7.00		15,780
<b>15</b>	<b>Curaçao</b>	<b>3.13</b>	<b>53.63</b>	<b>Unlimited</b>	<b>Unlimited</b>	<b>8.00</b>	<b>6.00</b>	<b>18,430</b>
16	Ecuador	3.19	14.69	Unlimited	70.00	7.00	12.00	5,960
17	Barbados	3.91	47.50	Unlimited	Unlimited	8.00	21.00	16,900
18	Belize	4.01	13.50	270.00	Unlimited	4.50	12.50	6,070
19	Argentina	4.01	20.63	400.00	70.00	4.00	26.00	9,960
20	Dominican Rep.	4.37	24.94	Unlimited	1000.00	3.00	30.00	8,100
21	Saint Lucia	4.73	34.44	2500.00	70.00	10.00		9,520
22	Jamaica	5.18	18.29	2500.00	Unlimited	5.00	25.00	5,190
23	Dominica	5.29	29.63	Unlimited	Unlimited	3.00	15.00	7,790
24	Grenada	5.64	41.15	1000.00	70.00	12.00		8,590
25	El Salvador	6.31	19.20	Unlimited	70.00	2.00		4,260
26	Nicaragua	6.61	10.03	Unlimited	5000.00	15.00	15.00	1,950
27	Saint Vincent and Grenadines	6.84	41.70	1000.00	70.00	12.00	16.00	8,720
28	Guatemala	6.94	26.16	200.00	70.00	9.60	12.00	4,940
29	Bolivia	7.90	20.41	140.00	70.00	2.00	13.00	3,290
30	Honduras	10.54	20.17	Unlimited	70.00	20.00	15.00	2,490
<b>Selected Countries</b>								
-	Singapore	0.30	13.51	1000.00	500.00	2.00	7.00	64,010
-	Qatar	0.40	16.48	140.00	70.00	2.00	0.00	62,310
-	Netherlands	0.51	22.91	Unlimited	Unlimited	2.00	21.00	55,200
-	Malta	0.54	12.05	200.00	200.00	10.00	18.00	30,760

Table 6 – Mobile data and voice high-consumption basket, 2021

## 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 BTP'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 4010 MHz spectrum, only 370 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
<b>Sub 1 GHz block</b>		
700 MHz band	60 MHz	90 MHz
850 MHz band	40 MHz	60 MHz
900 MHz band	40 MHz	40 MHz
<b>Sub total</b>	<b>140 MHz</b>	<b>190 MHz</b>
<b>1 - 6 GHz block</b>		
1800 MHz band	120 MHz	150 MHz
2100 MHz band	30 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	Not yet defined
<b>Sub total</b>	<b>230 MHz</b>	<b>820 MHz</b>
<b>6 GHz and higher block</b>		
26 GHz	0 MHz	3000 MHz
40 GHz	0 MHz	Not yet defined
66 GHz	0 MHz	Not yet defined
<b>Sub total</b>	<b>0 MHz</b>	<b>3000 MHz</b>
<b>Total allocated and licensed spectrum</b>	<b>370 MHz</b>	<b>4010 MHz</b>

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 2021 is 64.1 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.

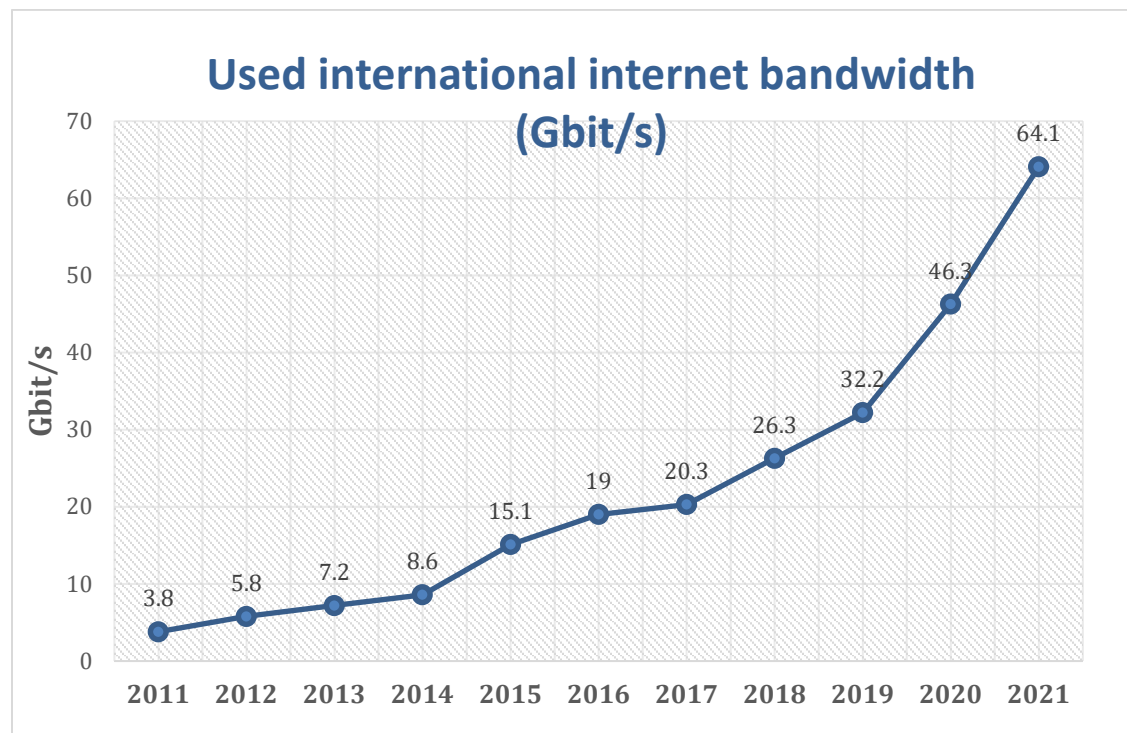


Figure 21: Used international internet bandwidth (Gbit/s), 2011-2021

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 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, Cloudflare, 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 the later to offer high speed fiber-optic internet connectivity to 118 schools, 8 schoolboards and the Ministry of Education, under a joint plan overseen by the Ministry of Education and Bureau Telecommunicatie en Post, after Digicel's proposal was selected as the best-suited technically and economically. The project will use Digicel and its subsidiary TRES Networks' fiber-optic network to provide three levels of internet access speeds to the different entities that are part of the education eco-system on the island.

In general, it can be stated that the eco-system consists of the Ministry of Education, Schoolboards, and the different school 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 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 infant shoes, 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, enabling information normalization for group 8 pupils;
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 2021 again showed a considerable drop in comparison with the previous year as illustrated in Figure 22. For EOY 2021, the total number of terrestrial multichannel TV subscriptions is 12.4 thousand compared to 20.5 thousand the year before. This represents an overall 8.1 thousand drop or 39.5% 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.

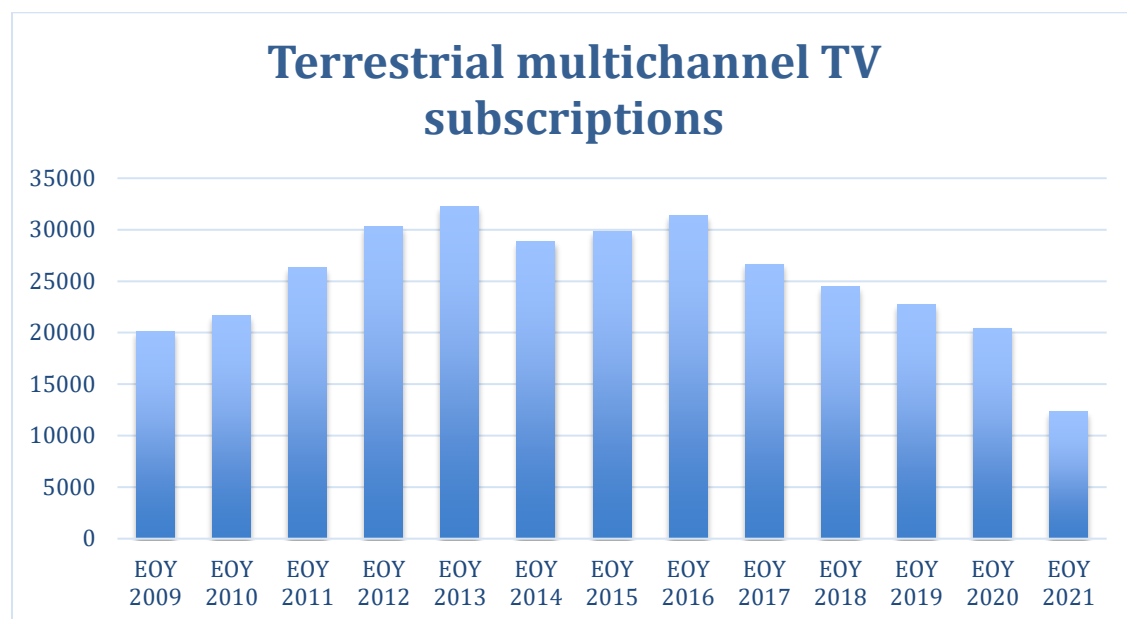


Figure 22: Terrestrial multichannel TV subscriptions, EOY 2009 – EOY 2021

## 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 Infrastructure".



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 11<sup>th</sup> in terms of affordability with 3.56% of the GNI p.c. in comparison with the rest of the region for the fixed broadband entry level basket and also at number 11<sup>th</sup> with 1.93% 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 when considering the digital divide.

It is clear that 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. 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 telecommunications infrastructure.

## Appendix A - Trends 2013-2022 for Curaçao

How to read the data:

1. Thousands are separated by an apostrophe (') and decimals by a period (.).
2. Other symbols used:

... or "blank"	Data not available (yet).
	Zero or a quantity less than the unit shown. Also used for data items that are not applicable.
Italics	Data in italics are BT&P estimates.

3. 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.
4. The Yearbook 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.
5. Please refer to Appendix B for definitions.
6. 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
<b>DEMOGRAPHY, ECONOMY</b>									
Population	154843	156971	158969	160337	160012	158659	156223	153671	151066
Households	55751	56494	57274	58010	58502	58384	61471	N/A	N/A
<b>FIXED TELEPHONE NETWORK</b>									
Fixed-telephone subscriptions	63715	61130	62571	59231	61709	60598	58625	53513	53095
Fixed-telephone subscriptions per 100 inhabitants	41.15	38.94	39.36	36.78	38.09	36.13	32.7	28.5	-
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
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
Total 1-minute fixed call in USDS	0.12	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12
<b>FIXED (WIRED) BROADBAND</b>									
Fixed (wired) Broadband subscriptions	37000	38663	40536	42713	46120	48080	49514	51466	54213
Fixed (wired) Internet Broadband subscriptions per 100 inhabitants	23.89	24.63	25.50	26.52	30.46	31.85	32.61	38.04	
<u>Fixed (wired) Broadband subscriptions by speed:</u>									
2 to less than 10 Mbit/s					17,914	16,479	16,538	11,105	3,141
10 to less than 30 Mbit/s					21,623	15,071	18,105	17,317	6,255
30 to less than 100 Mbit/s					7,553	17,740	18,515	24,784	21,689
Equal to or above 100 Mbit/s					103	108	150	150	27,314
<b>MOBILE-CELLULAR NETWORK</b>									
Mobile-cellular telephone subscriptions	203502	192569	190489	186644	187184	186390	184236	184710	168007
Mobile-cellular subscriptions per 100 inhabitants	129.79	121.55	119.17	115.89	115.55	114.52	112.73	113.63 <sup>(1)</sup>	
<u>Mobile population coverage by type of network:</u>									
3G mobile network			82%	95%	100%	100%	100%	100%	100%
LTE mobile network			15%	70%	70%	80%	90%	90%	95%
Mobile-cellular voice network			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
<b>INTERNET</b>									
International Internet bandwidth, in Mbit/s	7200	8600	15100	19000	20300	26300	32200	46300	64100
<b>OTHER INDICATORS</b>									
Terrestrial multichannel TV subscriptions	32212	28858	29866	31394	26667	24489	22766	20453	12367
<b>PERFORMANCE INDICATORS</b>									
Average download speed, in average Kb/s for the year (See appendix C for calculations)	12895	14744	15893	18760	21011	22000	23800	30700	45300

(1) Estimate.

Table 6 – Curaçao data EOY 2013 – EOY 2021

## 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.

## Telecommunication Services Performance Indicators

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.
<b>INTERNET</b>	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.
<b>FIXED (WIRED) BROADBAND BY</b>	The indicators in this category refer to fixed (wired)-broadband subscriptions by

<b>TECHNOLOGY</b>	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.
<b>WIRELESS BROADBAND</b>	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.
<b>OTHER INDICATORS</b>	
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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Average download speed	6726.7	12895.14	14744.24	15893	18760	21011	22110	238300	307400	453000	529000

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

Table 8 – 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 and 2022 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
<b>Curaçao</b>		<b>28.5</b>	<b>38.0</b>	<b>120.2</b>	<b>56.0</b>
<b>Caribbean</b>		<b>22.0</b>	<b>23.5</b>	<b>114.0</b>	<b>60.3</b>
<b>South America</b>		<b>14.2</b>	<b>15.1</b>	<b>113.1</b>	<b>76.5</b>
<b>Central America</b>		<b>10.1</b>	<b>9.1</b>	<b>112.6</b>	<b>54.5</b>
<b>World</b>		<b>0.0</b>	<b>15.0</b>	<b>105.0</b>	<b>75.0</b>
<b>Developed countries</b>		<b>0.0</b>	<b>34.0</b>	<b>133.0</b>	<b>125.0</b>
<b>Developing</b>		<b>0.0</b>	<b>12.0</b>	<b>99.0</b>	<b>65.0</b>
<b>LDCs</b>		<b>0.0</b>	<b>1.0</b>	<b>74.0</b>	<b>33.0</b>
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	29.1	8.6	198.6	51.8
Aruba	Aruba	32.8	17.8	132.3	
Lucayan Archipelago	Bahamas	22.4	20.4	114.7	97.7
Windward islands	Barbados	45.6	45.6	105.1	41.0
Lesser Antilles - Leeward islands	British Virgin Islands	22.7	21.8	113.8	32.4
Greater Antilles	Cayman Islands	53.5	47.5	148.6	
Greater Antilles	Cuba	13.3	2.1	59.0	30.8
Curaçao	Curaçao	28.5	38.0	120.2	56.0
Windward islands	Dominica	1.4	22.2	105.6	120.8
Greater Antilles	Dominican Rep.	10.5	9.4	81.7	69.9
Windward islands	Grenada	12.9	25.9	98.7	95.4
Greater Antilles	Haiti	0.1	0.3	64.7	28.6
Greater Antilles	Jamaica	15.5	13.7	101.9	61.8
Greater Antilles	Puerto Rico	21.8	20.5	106.8	85.8
Lesser Antilles - Leeward islands	Saint Kitts and Nevis	31.5	63.0	163.7	42.0
Windward islands	Saint Lucia	21.2	18.4	113.3	50.2
Windward islands	Saint Vincent and the Grenadines	11.9	23.6	92.8	60.2
Windward islands	Trinidad and Tobago	21.3	24.8	131.0	40.1
<b>AVERAGES</b>		<b>22.0</b>	<b>23.5</b>	<b>114.0</b>	<b>60.3</b>
<b>South America</b>					
	Argentina	16.33	21.25	121.60	68.89
	Bolivia	5.01	7.81	98.90	82.28
	Brazil	14.38	17.05	96.55	89.47
	Chile	13.31	19.50	129.89	100.82
	Colombia	14.23	15.25	132.87	61.76

## Telecommunication Services Performance Indicators

	Ecuador	11.73	13.48	88.04	55.97
	Paraguay	3.77	8.50	118.83	67.03
	Peru	7.22	8.30	118.18	78.60
	Suriname	17.01	15.20	148.15	86.72
	Uruguay	35.10	31.02	132.73	106.69
	Venezuela	18.43	8.99	58.07	43.75
<b>AVERAGES</b>		<b>14.2</b>	<b>15.1</b>	<b>113.1</b>	<b>76.5</b>
<b>Central America</b>					
	Belize	4.81	9.12	66.85	44.82
	Costa Rica	10.93	19.38	146.64	90.60
	El Salvador	14.21	9.31	158.10	54.40
	Guatemala	13.09	3.52	117.44	17.07
	Honduras	5.25	3.92	68.77	42.79
	Nicaragua	3.32	4.30	88.25	49.69
	Panama	18.84	13.83	142.25	82.41
<b>AVERAGES</b>		<b>10.1</b>	<b>9.1</b>	<b>112.6</b>	<b>54.5</b>

*Table 9 – List of countries and comparison data (penetration) 1 January 2021*

## Appendix D2 – List of countries and comparison prices 1-min call peak, on-net

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

## Telecommunication Services Performance Indicators

Argentina	0.29	0.27	0.38	0.41	0.28	0.29	0.47	0.32	0.28
Bolivia	0.22	0.22	0.22	0.17	0.17	0.17	0.17	0.17	0.17
Brazil	0.61	0.53							-
Chile	0.14	0.18	0.21	0.18	0.18	0.18	0.19	0.17	0.15
Colombia	0.18	0.19	0.17	0.13	0.11	0.12	0.02	0.07	0.06
Ecuador	0.18	0.20	0.20	0.20	0.20	0.11	0.11	0.11	0.17
Paraguay	0.14	0.18	0.17	0.04	0.04	0.04	0.20	0.17	0.12
Peru	0.19	0.18	0.17	0.15	0.15	0.15		0.15	0.14
Suriname	0.18	0.18	0.22	0.21	0.16	0.18	0.18	0.18	0.17
Uruguay	0.32	0.32	0.31	0.26	0.27	0.28		0.21	0.18
Venezuela	0.25	0.18	0.22	0.31		0.19			
<b>AVERAGES</b>	<b>0.24</b>	<b>0.24</b>	<b>0.23</b>	<b>0.21</b>	<b>0.17</b>	<b>0.17</b>	<b>0.19</b>	<b>0.17</b>	<b>0.14</b>

*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 and 2021

### 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 - 2021 – UTS;
- ITU Enquete EOY 2012 - 2021 – Flow;
- ITU Enquete EOY 2012 - 2021 – Digicel;
- ITU Enquete EOY 2012 - 2021 – TRES;
- ITU Enquete EOY 2012, 2013, 2014 – Scarlet;
- ITU Enquete ICT Price Basket EOY 2012 – 2019;
- Curaçao Fixed Internet Penetration Indicators, BT&P;
- BTP aansluitpuntgegevens concessiehouders 2012 - 2021;
- 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 2005-2021;
- ITU Measuring the Information Society 2013, 2014, 2015, 2016, 2017, 2018;
- ITU World Telecommunication/ICT Indicators (WTI) database 2016 - 2022;
- ITU Handbook for the collection of administrative data on telecommunications/ICT, 2020 edition;
- CBS: Population and Population Growth of Curaçao; [www.cbs.cw](http://www.cbs.cw) ;
- CBS: Gross national income of Curaçao; [www.cbs.cw](http://www.cbs.cw) ;
- World bank: World development indicators, GNI per Capita (1-7-2020), (30-7-2021) and (22-12-2022) downloaded from [data.worldbank.org/indicator](http://data.worldbank.org/indicator) ;
- United Nations Development Programme, 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 – 2021;
- Policy Brief: The affordability of ICT services 2021 – ITU;
- Global Connectivity Report 2022 – ITU;
- The State of Broadband: Accelerating broadband for new realities (Sep 2022) – 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

## Appendix F – List of concession holders and broadband technologies

Operator	Technologies
FLOW Columbus Communications	Fixed-Wired Broadband: Fibre-to-the-Home or Building, HFC Mobile: 4G LTE International communication
Digicel (TRES)	Fixed-Wired Broadband: Fibre-to-the-Home or Building Wireless-broadband: LTE Mobile: 4G LTE International communication
TerraMobile B.V.	Mobile: 4G LTE
Smitcoms N.V.	International communication
Flamingo TV Bonaire	International communication
Evolving Communications N.V.	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. Alonso de Ojeda: providing connection to Aruba;
3. EC-Link: providing connection to Trinidad & Tobago and Bonaire (Jerry Newton/EC-Link extension);
4. Amerigo Vespucci: providing connection to Bonaire;
5. PCCS (& Alonso de Ojeda II to Aruba): providing connections to the Caribbean, South America, and the USA.
6. ~~Americas II: providing connections to Venezuela, St. Croix and the rest of the Caribbean, including additional logical routes to Miami (USA) and Brazil;~~

## **Appendix H – List of data centers in Curaçao**

E-Commerce Park Curacao

Blue NAP Americas

CORE N.V. Curacao

Digicel/TRES Networks