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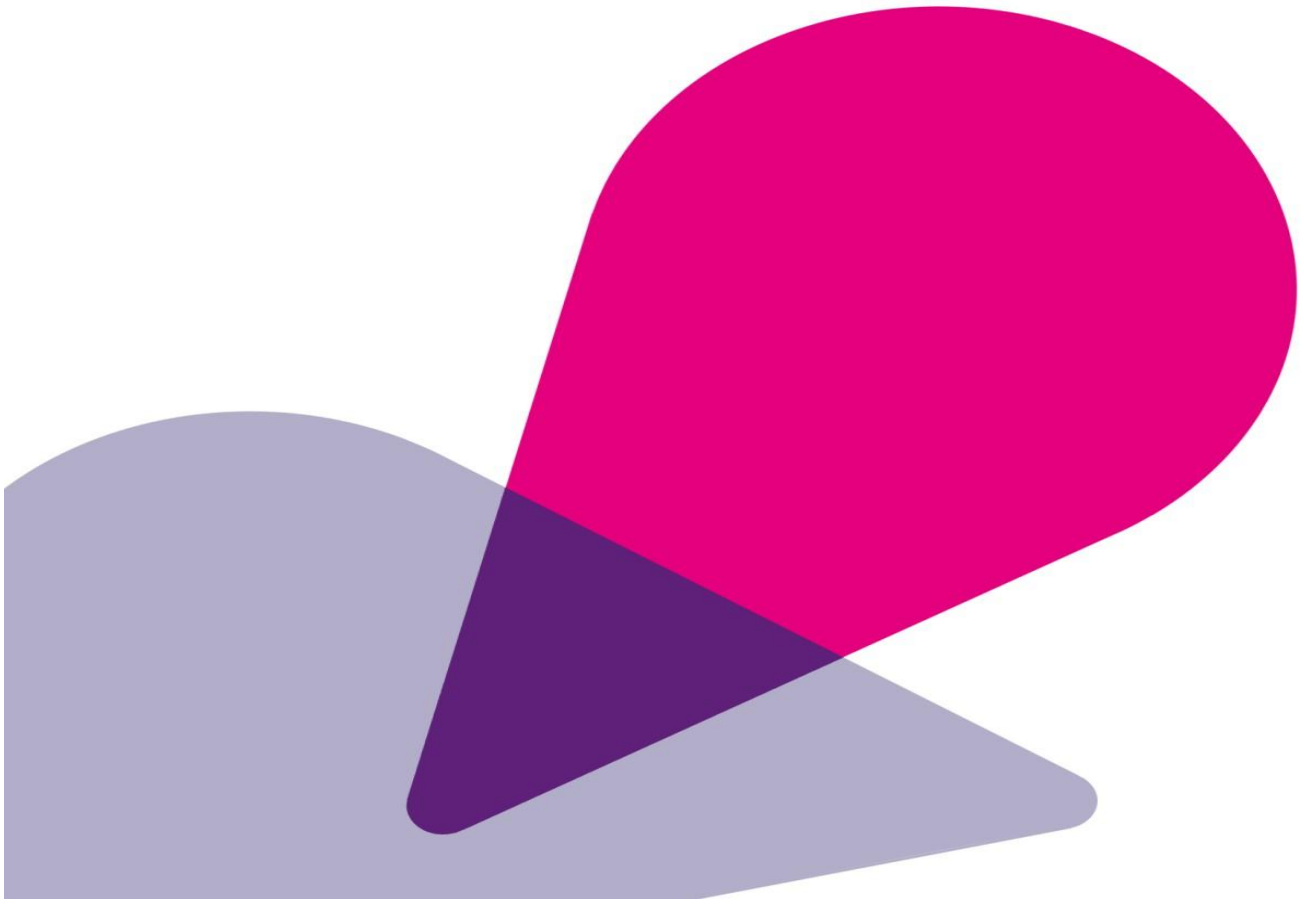
Marktordening telecom in Caribbean Netherlands

Report of research



Markten goed laten werken voor mensen en bedrijven

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1 Introduction

Commissioned by the Ministry of Economic Affairs (EZ), the Netherlands Authority for Consumers and Markets (ACM) has conducted research into possible models for regulating the telecom market in the Caribbean Netherlands (CN)[1]. On the basis of that investigation, the Ministry requests the ACM to provide insight into the
possible market regulation models for CN and to advise on the most feasible route in view of scale, market structure, and existing laws and regulations and possible legal consequences of a different market model.

The Ministry of Economic Affairs can use this research to revise the current market organisation in the Caribbean Netherlands and thus improve the quality and affordability of fixed and mobile telecom networks and services.

This report contains a first exploration of a number of possible market regulation models for the Caribbean Netherlands. For this exploratory study, use was made, among other things, of the knowledge and experience that ACM has as the regulator of telecom in the European and Caribbean Netherlands. In addition, interviews were held with concessionaires, representatives of the Public Entities in CN, the Ministries of Economic Affairs and the Interior and Kingdom Relations, the National Inspectorate for Digital Infrastructure (RDI), and other parties involved.[2] In addition, the researchers have drawn on the available literature and legislation by means of desk research.

Because of the intrinsic characteristics and geographical aspects of telecom in CN, it is unlikely that a telecom market comparable to the European Netherlands (EN) – in terms of prices and quality – can be achieved by adjusting the market organisation alone. Moreover, adjusting the market organization is a far-reaching operation that takes a lot of time. For this reason, this report also discusses other options that can contribute to a more favourable outcome of the market within the current market regulation model. These options stem from ACM's experience in telecom regulation in the European and Caribbean Netherlands.

The starting point for all policy proposals is the pursuit of a telecom market with a choice between and ultimately a better price-quality ratio3 of telecom services. The policy proposals are always described in outline. With regard to certain policy options, it would be interesting to explore whether a broader regional approach for the Caribbean part of the Kingdom (hereinafter: CDvhK) is possible, i.e. an approach for both the BES and the CAS islands (Curaçao, Aruba, and Sint Maarten). Where this is the case, this is identified in the report but not further elaborated.

The report is structured as follows. Policy options within the current market organisation in CN, which do not require a change in the law and which can therefore be realised in the relatively short term, are elaborated in Chapter 3. Policy options that fit within the current market organisation, but which probably require a change in the law, can be found in chapter 4. These policy options are likely to be realised in the medium term. Finally, in Chapter 5, a number of different market organization models are elaborated in more detail. These models are more fundamental in nature and require large-scale policy adjustments. The introduction of a new market organisation model is
is expected to be a time-consuming process and therefore assumes a longer time horizon. With each policy option and with each market organization model, many variations are possible in its further elaboration. In the context of this assignment, it was not possible to use these variants and combinations of
in detail. The report is therefore always limited to a description of the main points of the

[1] Bonaire, Saba, in Sint Eustatius.
[2] Annex II.
[3] Quality can be expressed in terms of bandwidth, latency, reliability and availability.

possible models and their possible implications. Frequently used abbreviations and terms in this report are included and explained in more detail in Annex III.

In this report, ACM does not express a preference for a particular market regulation model that relates to the Caribbean Netherlands.

2 Context and production chain telecom CN

2.1 Situation

The telecom market in the Caribbean Netherlands is characterized by (partly unavoidably) high costs due to geographical location, local challenges such as hard volcanic soils, mountainous landscape, hurricane area) and small to very small-scale markets. These external factors are a given and cannot be influenced.

Telecom services, divided into voice and data, are offered by concessionaires over fixed and mobile networks4. The high costs that concessionaires have to deal with are reflected in the end-user tariffs. Compared to the European Netherlands, the tariffs are relatively high, especially on St. Eustatius, and are currently compensated by
end-user subsidies.[5] The islands' economy can be qualified as that of *small island developing states6*, with similar challenges to affordable connectivity, such as low population, relative remoteness, small scale, and high reliance on submarine cables.[7]
Due to such circumstances, a telecom market with outcomes at the European level remains a challenge, regardless of the market organisation.

On the islands in the Caribbean Netherlands, the management of the network and the provision of services are vertically integrated within companies with a fixed (local) and/or mobile concession8. Table 1 shows an overview of the concessionaires in CN. All three islands have (incumbent) providers of fixed and mobile networks that are owned by the island government.

There are two fixed network providers active on Bonaire, called TELBO and Flamingo TV. In addition, there are three mobile network providers (MNOs) active on Bonaire, namely TELBO, Flow and Digicel. As a result, there is competition on Bonaire within the concession system. Currently, the roll-out of FttH (Fiber to the Home) and HFC (Hybrid Fiber Coax) networks on Bonaire is partly subsidized by the State9. In addition, a subsidy is also given on the internet subscriptions (fixed only) of end users.

On Saba and St Eustatius, the incumbents are the only fixed network providers. Satel is active as a fixed network provider on Saba and Eutel is active as a fixed network provider on St. Eustatius. In addition, two mobile network providers (MNEs) are active on both Saba and St Eustatius. On Saba, these are currently TelCell (based on the Satel concession) and Flow, and on St. Eustatius, these are TelCell (the same on the basis of Eutel) and Flow. On the Windward Islands (Sint Maarten, Saba, Sint Eustatius) there is
one alternative, commercial mobile network active. The roll-out of FttH is also being implemented on these islands.

[4] With an upcoming policy change, concessions for satellite internet services in CN will be possible in the near future.
[5] The State of Digital Infrastructure 2024, p. 72, https://open.overheid.nl/documenten/9c5f2d91-fafc-405e-b330-96d6211677bc/file.
[6] UN.org, http://www.un.org/ohrlls/content/about-small-island-developing-states.
[7] Internet Society.org, *Ensuring Sustainable Connectivity in Small Island Developing States*, 2017, https://www.internetsociety.org/wp-content/uploads/2017/08/ISOC_Small_Island_Developing_States-201706015.pdf.
[8] Part of the network (core) of some mobile networks is outsourced to an external party.
[9] Through an incidental subsidy for the modernization of the fixed networks on the BES.

networks are partly subsidized by the State and the incumbents receive a subsidy to reduce the rates of end users.

Table 1: Concessionaires of Bonaire, St Eustatius and Saba

	Solid	Mobile
Bonaire	TELBO Flamingo TV	TELBO Flow (Antelecom) Digicel (Antilliano By)
Sint Eustatius	Eutel	Eutel (TelCell) Flow (WICC)
Saba	Satel	Satel (TelCell) Flow (WICC)

Access to submarine cables, which is important for connections to and from the islands, tends to be a monopoly situation, with a high dependence on a single company for inter-country connectivity.[10] The ownership of the submarine cable that connects Saba and St. Eustatius to the broader network of submarine cables and exchanges is in the hands of the government. The sea cables that connect Bonaire to the outside world are largely in the hands of a single commercial party (LLA).

Video streaming and communication services are increasingly offered by CAPs (Content & Application Providers) OTT (over the top), with the digital offer increasingly competing with telecommunications services traditionally offered by concessionaires (CHs) such as voice telephony and television.

2.2 Political framework

Saba, St. Eustatius and Bonaire are special municipalities and therefore have a separate status within the Netherlands. This means, among other things, that the legislation that applies to telecommunications in the European Netherlands does not apply to the three islands.

On Saba, St. Eustatius and Bonaire, the BES Telecommunications Facilities Act (WTv BES) forms the basis of all telecommunications legislation. The WTv BES regulates the regulations regarding the use of telecommunications equipment. For example, the concessions for fixed and mobile telephony, required authorizations for radio transmitting equipment and also various forms of supervision (testing, inspection and the imposition of sanctions) are regulated in this law. The WTv BES in turn includes various decisions and regulations, the so-called subordinate regulations. Examples of subordinate legislation are the Decree on the designation of the regulator under the BES Telecommunications Facilities Act , the BES Wire Broadcasting and Cable Establishments Decree, the BES Commissioned Telecommunications Services Decree (BOT) and the General Guidelines for Holders of a Concession WTv BES (BARC) Decree. Supervision of compliance with this legislation is the responsibility of the RDI and the ACM.

Curaçao, Aruba and Sint Maarten are separate countries within the Kingdom of the Netherlands. The CAS Islands are autonomous jurisdictions with regard to telecom regulation. Telecom markets are regulated in local national ordinances. In terms of system and structure, these national ordinances are broadly similar to the WTv BES and underlying regulations and are also based on a concession system. Market surveillance is entrusted to local supervisory authorities.

[10] Rijksoverheid.nl, Pioneer, *Research into Data Subsea Cables: Enabling Caribbean Netherlands digitally*, 2024, https://www.rijksoverheid.nl/documenten/rapporten/2024/09/23/bijlage-2-research-into-data-subsea-cables-enabling-caribbean-netherlands-digitally.

The EU treaties have not been ratified for the CCT, which means that the islands are outside the territorial scope of the acquis communautaire and European law. The islands thus have the status of Overseas Countries and Territories (OCTs).

2.3 Production chain

Building and delivering end-user connectivity requires different services and facilities. These services and facilities are the components of a production chain. Of this production chain, only the *last mile* of the network (the local network) on the islands is provided by the CH. For submarine cable access and IP interconnection, CHs are, by their very nature, dependent on connectivity with third parties – such as submarine cable operators, transit providers, Internet exchange points, and hosting providers – that are located outside CN at the time of writing. The transit or submarine cable access components typically need to be procured by the CHs. In this way, the CHs provide connectivity between their own local loop and the rest of the global internet.

The Dutch government can only influence the production chain of the internet access services by means of regulation (currently in concessions and authorisations), insofar as these parts of the production chain are located on Dutch territory, or when they are operated by a Dutch state participation. This concerns the (components of the) local loops and the landing stations. These components are outlined in black in Table 2 below. The governance of the incumbent CHs and the state participation in the SSCS submarine cable can be steered indirectly through the shareholding in those companies.

Broadly speaking, the essential components can be divided into the following categories in a simplified view. Satellite internet access is not taken into account. This overview, based on the current market organisation, is the starting point for possible policy options and alternative market organisation models in this report.

Table 2: CN telecom production chain

INTERCONNECTION			
COMPONENT	PARTY	MARKET REGULATION	
Sea cables	Zeekabelexploitant	In the	Unregulated
	Zeekabelexploitant	On island	Authorisation conditions
Kabellandingsstations	Zeekabelexploitant	Authorisation conditions	
Transit (Voice & IP)	Transit provider11	Unregulated	
Peering	IXP (Exchange)	Unregulated	
Hosting, caching	Content & application provider, Datacenter provider, hosting provider, CDN provider, etc.	Unregulated	

Table 2a: CN telecom production chain

INTERNET ACCESS SERVICES (CONCESSIONAIRE LOCAL LOOP)		
COMPONENT	**PARTY**	**MARKET REGULATION**
Billing, customer service, etc.	Concessionaire	Concession Conditions / Guidelines
Backbone en core network	Concessionaire or sharing telecom network operator12	Concession Conditions / Guidelines
Backhaul connections	Concessionaire or sharing (telecom or energy) network operator	Concession Conditions / Guidelines
Supporting physical infrastructure (masts, ducts, piles and trenches)	Concessionaire or sharing network operator	Concession Conditions / Guidelines
Fixed networks (FttH, HFC, or DSL connection network)	Permanent concessionaire	Concession Conditions / Guidelines
Mobile networks (Masten, Radio Access Network (RAN), core network)	Mobile concessionaire	Concession Conditions / Guidelines

[11] Usually sea cable provider.
[12] The concessionaires or sharing network operators of the backbone and core network are Satel and Telbo.

3 Possible initiatives within the current market organisation

3.1 Introduction

This chapter sets out a number of possible initiatives that fit within the current legislation for the Caribbean Netherlands. In the relatively short term, these initiatives are possible to improve connectivity on the islands, efficiency of the roll-out of telecom networks and the accessibility of telecom services. No legislative changes are required to achieve the various policy options.

In this chapter, three possible initiatives are put side by side.[13] The first possible initiative concerns the connection of public WiFi hotspots on the islands (section 3.2). The second possible initiative concerns the taking of subsidy measures for procurement costs incurred by CHs in combination with the obligation for CHs to provide universal service (section 3.3). The last possible initiative concerns the possible geographical coordination of the roll-out of telecom networks and the promotion of the sharing of physical infrastructure on the islands (section 3.4).

3.2 Publieke WiFi hotspots

Internet access is essential today for many personal matters and for digital inclusion. Without the State's end-user subsidy, which is provided to CHs per fixed internet subscriber, internet access for people with no or low incomes is currently not very affordable.

On Saba, *Publicroam* has been available in various public places since October 1, 2024. Publicroam is an initiative that enables organizations to offer visitors to government institutions and educational institutions safe and easy access to their guest Wi-Fi with one account.

In the relatively short term, additional public, public WiFi networks in busy places on the other islands could make a direct contribution to connectivity on the islands. Especially for end users who have difficulty with the affordability of fixed or mobile services (in the absence of demand subsidy), WiFi hotspots can contribute to the accessibility of connection to online services.

On islands where there is (temporarily) no mobile coverage due to circumstances, WiFi hotspots can have a direct impact on the accessibility of local residents and businesses. WiFi hotspots also stimulate local connectivity on other islands. For example, WiFi hotspots can be connected to the networks of local government buildings and utilities. For such an initiative, it is important that the necessary measures are taken to secure the network and its users and to prevent abuse. Bali14 and Taiwan[15] are examples of islands where a public hotspot network has been rolled out at the initiative of the government in busy places.

With regard to this option, it should be noted that public Wi-Fi does not provide a better price-quality ratio of the (dedicated) telecommunications services as they are currently offered by the CHs, but rather a complementary, low-threshold public service to promote connectivity. In addition, this option is mainly relevant for accessibility and
Poverty reduction. The public Wi-Fi will probably be complementary to the dedicated mobile and fixed telecom services. However, in order to rule out the possibility that overly intensive use of public WiFi affects the demand for services of the CHs, limitations of the public WiFi in the
datavolume of in tijd.

[13] This list is not exhaustive, other initiatives may be possible.
[14] Thebalisun.com, https://thebalisun.com/bali-rolls-out-free-public-wifi-around-the-island/.
[15] Itaiwan.gov.tw, https://itaiwan.gov.tw/EN.

ACM has briefly discussed this possibility with a number of CHs. This showed that in such an initiative it is important to also safeguard the interests of the CH. One can think of (technical) safeguards to prevent a lack of availability of data or if they lose customers (and therefore turnover) as a result of the public Wi-Fi hotspots. Close cooperation or coordination with the CHs is important in this initiative.

3.3 Inputsubsidie

Mainly because of high purchasing costs, which have to be recouped over a relatively small customer base, telecommunications services are relatively expensive in CN. The temporary end-user subsidy for fixed services provides affordable fixed internet services. At the same time, due to its universal application, this measure is rather untargeted in relation to the objective of affordability and the measure can potentially cause market-distorting effects according to some stakeholders. Another factor is that, on the basis of the current laws and regulations in CN, CHs may - under certain circumstances - choose to no longer offer the commissioned voice service, the availability of which is considered to be of social importance, due to the commercial unprofitability in practice. Adjustments to the relevant concessions are necessary. In such a case,
they may be able to offer only the internet as a dedicated service on the basis of an amended fixed concession.

For the cost control of CHs, support measures can be considered in which the procurement and/or roll-out costs of CHs are subsidised. In ACM's discussions with CHs, for example, the maintenance of the (unprofitable) offer of fixed voice services was discussed, which is essential for the dialability of emergency numbers and availability in the event of a power failure. In this context, consideration could be given to reimbursing the costs associated with (for example) transit for voice and the telephone exchange (switch) by the State.[16] Data services can also contribute to the high costs of transit. Several CHs have pointed out to ACM that the costs of IP transit are still high, with the CHs having little negotiating power. The subsidisation of purchasing costs at CHs can lead to lower retail rates if lower costs are passed on. In addition, the range of fixed voice services of CHs can be maintained. Compared to the end-user subsidy for fixed services only, the support is thus used in a more targeted way. The roll-out of high-quality telecom networks can also be (further) subsidised. [A 17]. It should be noted that this measure does not change the level of the purchase costs. For this, a different form of market organization seems desirable and necessary.

The feasibility of this option depends on the political will to award this new form of subsidy for telecom in CN in a targeted manner. The continuation of the voice offer can be easily monitored. This option only requires CHs to report on the operational costs. Compared to the end-user subsidy, this use of subsidy results in an increase in administrative burden.

3.4 Promoting sharing of physical infrastructure

[16] Alternatively, it could be examined whether voice as a dedicated service could be abandoned, in view of the possibility of non-number-based calling via the internet (OTT). This will probably require that emergency centres remain accessible in this way (i.e. without an emergency number).
[17] In addition to the retail subsidy, an incidental subsidy was paid to CHs in 2024 for the modernisation of the fixed networks. The upgrading of the networks to more modern technology is likely to result in lower ongoing costs for the CHs related to maintenance and energy consumption, and improved pricing
quality of the services for end-users.

Although infrastructure competition can lead to efficient competition from retail under certain circumstances, unnecessary duplication of physical infrastructure in the roll-out and operation of the new generations of telecommunications networks may also lead to inefficiencies and additional nuisance for residents and businesses. Especially when telecom network operators can also use existing infrastructure, or infrastructure that another network operator such as a network operator or a drinking water company intends to build. A coordinated rollout can help keep costs down.

Concrete plans are currently being made and implemented in the Caribbean Netherlands for the roll-out of the latest generation of networks. For example, new fixed networks (fiber optics) are being built and existing (cable) networks are being upgraded, whereby the roll-out and modernization of the aforementioned fixed networks is stimulated with a one-off government subsidy. 5G is also being rolled out. For the roll-out of fixed and mobile networks, it is very beneficial if the deploying party can use the (passive) physical infrastructure already in place or to be constructed at the same time for the construction of Very High Capacity Networks (VHCN) and at reasonable (cost-oriented) rates. This includes supporting infrastructure such as trenches, ducts, masts, sites, locations, outbuildings and street cabinets.[18] Currently, the sharing of such infrastructure is limited in the
scale is already taking place, but not yet everywhere.

On the other hand, it is also possible to have passive parts of the physical infrastructure (such as ducts) rolled out in combination, with network operators, drinking water companies and telecom operators sharing the physical infrastructure where possible. This may also contribute to a more efficient rollout.[A] [19]

A possible effect of coordinating the deployment of telecom networks and the sharing of physical infrastructure is a reduction in the deployment costs of the latest generation of networks. It can also be ensured that every company and household has access to at least one high-quality open connection. The low passed-on roll-out costs are likely to translate into lower
retail rates at the market parties.

[18] On the basis of Article 5 of the Decree on General Guidelines for Holders of Concessions under the Telecommunications Facilities Act
BES (BARC) allows CHs to request access to each other's facilities.
[19] Bionda Fonseca-Hoeve, Michele Marius, Shernon Osepa, Jane Coffin, and Michael Kende; *Unleashing the Internet in the Caribbean*, 2017, p.5., https://unctad.org/system/files/non-official-document/dtl_eWeek2017c06-isoc_en.pdf. For further background on infrastructure sharing, see e.g. https://digitalregulation.org/the-infrastructure-sharing-imperative/.

4 Possible additions to the current policy framework

4.1 Introduction

In the previous chapter, various possibilities were set out for initiatives in the Caribbean Netherlands, which relate to improving the efficiency of the roll-out and accessibility of telecom services. This chapter outlines various policy options - both regulatory and policy - that can contribute to the improvement of the telecom market and the connectivity offer in CN.[20] These policy options fit within the current market organisation. However, in ACM's estimation, an amendment to the law is necessary. These possible initiatives are therefore likely to have an effect in the medium term.

Implementing these possibilities on current policy could lead to, among other things, the tightening of competition in CN, the reduction of roaming costs for (business) mobile users between the various islands and an increase in innovation and willingness to invest among (telecom) companies. Possibilities for reducing the administrative burden for CHs are also explained. Some options require a change in the law and/or financial coverage. This is explicitly mentioned per possibility if applicable.

In this chapter, five different options for policy adjustments are put side by side. This concerns the introduction of number portability (section 4.2), alignment with the European Roaming Regulation21 (section 4.3), regulating access to and interconnection with submarine cables (section 4.4), changing the definition of *dedicated services* in the BOT (section 4.5)
and the exemption of commissioned services from ABB tax (section 4.6).

4.2 Number portability

In CN, there are high switching barriers for consumers as they cannot take their phone number with them when switching mobile providers and must inform all their connections about their new phone number. It is also important for companies that purchase telephony services to stick to a certain number.[22] The introduction of number portability (number portability) may contribute to an increase in switching options for mobile voice subscribers. Switching to another mobile provider can have various reasons, for example because another provider offers a better and/or cheaper subscription. As a result, consumer switching increases competitive pressure, with mobile operators being encouraged to continue to improve their telephony services and offer their telephony services at low tariffs.

The obligation to port numbers could thus contribute to better market functioning, with providers competing more on merits such as network quality and price, resulting in a better price-quality ratio of the mobile offer. End users are therefore not bothered by *lock-in* effects due to number portability and can benefit from low switching barriers.

Number portability can be arranged through an adjustment of CN's legal telecom framework. Of the CHs, number portability requires implementation in business operations and reconciliation that could best be done through a neutral third party. This can be linked to an existing platform such as association COIN from ENL or the platform on Curaçao. For a possible interpretation of number portability

[20] These possible policy additions are also not exhaustive.
[21] Verregening (EU) 2022/612 - Regulation - 2022/612 - EN - EUR-Lex.
[22] The lack of number portability is only an issue in mobile telephony. With fixed telephony, this plays into The Caribbean Netherlands does not, as there is currently only one provider of fixed voice services per island and switching is therefore not possible.

in the Caribbean Netherlands, one could look at Article 4.10 of the Telecommunications Act, the Number Portability Decree, the Designation Decree and the Policy Rules for Number Portability 2008. In Curaçao, number portability has been introduced through a recent amendment to the National Telecommunications Ordinance.[A 23]

4.3 Roaming

Very high roaming costs are an obstacle to inter-island traffic. Local residents and businesses visiting other islands within CN may face high roaming charges on another CN island. In practice, residents are often forced to purchase a separate SIM card for each island they visit in order to avoid high roaming fees. To this end, it could be examined whether it is possible to regulate end-user tariffs for roaming within CN. Roaming can be regulated within CN, within the CDvhK, or can be joined by the European roaming regulation. As the territorial scope increases, there will be more impact for end users and telecom providers.

Regulating roaming charges directly affects the control of the high costs of mobile telephony for residents and entrepreneurs who travel between the islands. Moreover, this creates a level playing field between larger (international) providers with mobile networks on multiple islands (and therefore possibly lower roaming rates on these islands) and providers with a limited presence on one or a few islands. At the same time, regulating roaming charges can have a detrimental effect on telecom providers if the profit of providers is (too much) limited by lower roaming charges. To compensate for this loss of profit, telecom providers can increase the mobile rates for other customers. It is therefore important to make a good assessment when deciding on roaming regulation.

Mobile providers are not allowed to charge separate rates to end users for the use of mobile internet in the (relevant) foreign country (e.g. CN), and are obliged to ensure equivalent quality of connections in the (relevant) foreign country. The wholesale roaming rates that the relevant mobile providers charge each other will also be capped. It may be sufficient to arrange that CHs do not charge each other roaming charges to each other's end users in combination with capping wholesale roaming fees.

A possible subsequent stage could consist of extending the roaming regulation to the entire Caribbean part of the Kingdom. This has a high degree of legal complexity in the implementation, given the constitutional and legal framework (section 2.2), but is ultimately also expected to have a high impact on the affordability of services related to traffic between the islands.

This problem is not present in Caribbean France because those islands fall under the European Roaming Regulation, so that "roam like at home" applies there with a SIM from the European Economic Area.

Although the legal possibilities should be explored, as long as CN islands have the status of special municipalities, the European Roaming Regulation could be followed as much as possible or made applicable mutatis mutandis to the islands. Joining the European roaming space requires reciprocity: with a SIM from the European Economic Area (EEA), roaming can then be done in the CN at the same cost and conditions
as a local mobile user, and vice versa, as is also the case in Caribbean France, for example.

[23] RAC Annual Report 2023.

The implementation of roaming requires regulation taking into account potential issues or bottlenecks on a legal, economic and technical level.[A 24]

4.4 Regulation of submarine cables

The affordability of telecommunications services is under pressure due to the high cost of connectivity of the islands that CHs pay to transit providers. These high costs are reflected in the end-user tariffs. A large part of the opex of CHs consists of the costs for IP transit. CHs are also dependent on the submarine cables for the quality and continuity of the services.

Access to, and interconnection with, the submarine cables are in fact not regulated, resulting in risks for the CHs in terms of dependency and availability. For example, CHs may face service limitations, lack of clarity about cost and interconnection, or insufficiently communicated interruptions due to maintenance. In general, this situation arises from the fact that the submarine cables fall outside the Dutch jurisdiction. At present only with regard to the Windward Islands, however, the submarine cable is managed by a state participation. The potential benefits for CHs of this situation are not sufficiently exploited in relation to the governance structure of the submarine cable and the fact that the supervision of charging and cooperation with the dependent CHs has been left unregulated.

Transparency and control of the tariffs charged by state-owned companies, for example in the form of a public reference offer and capping cost-oriented tariffs, could contribute to potentially significant cost savings for CHs dependent on such submarine cables.[25] In addition, CHs are interested in the possibility of purchasing capacity (strands on the submarine cable) themselves and, if desired, lighting it themselves.

The lower costs for connectivity between the islands (transit) may eventually translate into lower costs for end users in the long term. Affordable connectivity to and from the islands via sea cables and the associated cable landing stations is of great importance for the islands, especially for the affordability, continuity and quality of ultimately the retail services. For the time being, this option is only relevant for Windward CN. The feasibility of unbundled access with regard to existing submarine cables may be legally complex in connection with the existing user rights and current contracts, in combination with the involvement of various ministries.

CHs need complete and up-to-date information from submarine cable operators on matters relevant to CHs, such as interruptions and maintenance. With regard to all submarine cables, including the other submarine cables that are not state-owned but do land on the BES islands, it could be considered to expand the access and interconnection rules as they are currently regulated for CHs among themselves and to bring them under the supervision of the ACM. This could include obligations for submarine cable operators to properly inform CHs about upcoming interruptions or changes in connectivity, routing and tariffs. The ACM could supervise the
compliance with these obligations, and possible disputes between landing submarine cables and CHs may be
settle.

[24] Although roaming regulation is not expected to have an impact on this, the very high costs of roaming may currently constitute an interesting business model for providers from surrounding islands, who may try to catch residents and tourists on CN on their networks and then charge high roaming charges. This is a form of undesirable competition for CN, with profits for CHs draining to companies outside CN and high costs for residents and tourists.
[25] Internet Society.org, *Ensuring Sustainable Connectivity in Small Island Developing States*, 2017, p. 29 en 42-43, https://www.internetsociety.org/wp-content/uploads/2017/08/ISOC_Small_Island_Developing_States-201706015.pdf.

4.5 Eliminating the distinction between commissioned services

In the current (and future) framework, commissioned services can be commissioned via the infrastructures defined in the BES (BOT) Decree, namely: mobile services via mobile networks and fixed services via fixed networks. Long-distance telecommunications services have also been defined, and satellite telecommunications services will soon be added.In practice, however, there is increasing convergence between service offerings across networks. For example, "fixed" services (*Fixed Wireless Access, FWA) are offered via mobile networks*, which in some cases can also be used as an alternative in Europe.
for fixed networks (e.g. in areas where the roll-out of fibre is unprofitable)
and may in the future be offered via satellite mobile services (*Direct to Device, D2D*).

In order to future-proof the concession system, it could be considered to define the mandated services flexibly in an *infra-neutral* way, which would mean that the mandated services would be decoupled from a certain infrastructure.

This policy change can be used to increase innovation. Furthermore, legal certainty for CHs can increase the willingness to invest and, ultimately, improve the quality of services for end-users. CH can freely choose which connectivity options best suit the local situation and the requirements of end users, which can also potentially result in cost savings. From a legal point of view, the relevant legislative amendment can be implemented relatively easily and can in all likelihood count on the support of the CHs.

4.6 Reduction of the administrative burden

There are various options for reducing the administrative burden and tax burden of CHs. Energy, drinking water, and mail are examples of essential services that are already exempt from ABB.[26] It is conceivable that the services provided for by fixed and mobile telecommunications networks could be exempted from ABB. This requires the approval of the Ministry of Finance and is likely to require a tax change in the law and financial coverage for the tax revenues in question.

Consideration could also be given to simplifying the levying of the supervision costs - which are calculated per connection point - and, for example, to calculate them on the basis of turnover data. This relieves the CHs of the administrative burden associated with the complex system
about (numbers of) network connection points.

[26] Belastingdienst-cn.nl, https://www.belastingdienst-cn.nl/onderwerpen/algemene-bestedingsbelasting-bedrijven/vrijstellingen-abb.

5 The ground thunder model

5.1 Introduction

As described above, telecom services in the Caribbean Netherlands have improved in recent years within the current market regulation model. Investments have been made in the networks and the price-quality ratio of the services has improved. At the same time, the provision of fixed and mobile telecom services in the Caribbean Netherlands is and will continue to be associated with high costs due to local circumstances.

The current market organisation is based on a concession model. This model is characterized by multiple (mainly mobile) networks owned by both public entities and private companies, a light form of regulation and competition between network owners. This market regulation model has a number of weaknesses. This status quo is described in section 5.2 and forms the frame of reference for the various alternative market organisation models.

With alternative market regulation models, it is conceivable that the quality of services can be increased and the rates for this can be lowered. When developing alternative forms of market organisation, a large number of design dimensions can be varied, such as one or more networks, vertical integration or separation of services, regulated or negotiated access, etc. This leads to a multitude of possible market regulation models.

This chapter focuses mainly on market regulation models that take maximum advantage of economies of scale and breadth. These benefits could encourage further investment in the improvement and expansion of telecom networks. In addition, it also looks at stimulating retail competition by lowering the barriers to entry and increasing the possible scale.

For each market organization model, many variations are possible in its further elaboration. In the context of the assignment, it is not possible to elaborate on these variants in detail. The report is therefore always limited to an outline description of possible models and their possible implications. The models described cover a number of different design dimensions, such as the number of networks on the islands, the ownership of these networks, the degree of competition and the degree of regulation in the market.

In this chapter, therefore, three alternative market organisation models are elaborated. This concerns a general authorisation model or liberalised model (section 5.3), retail price regulation (section 5.4) and an integrated open wholesale model (section 5.5). These models have very different effects both in terms of the potential necessary adjustments to current laws and regulations, as well as the degree of regulation and the resulting effects on quality, choice and price. For example, in a general authorization model or liberalized model, more companies could enter in the short term due to lower barriers to entry than in the status quo. Such a model could therefore boost competition and lead to more choice in the short term. Retail price regulation seems especially desirable if there is only one (monopoly) network and is characterized by more far-reaching regulation. With the regulation of retail prices, the price paid by consumers is directly determined by the government and competition between different providers is strictly speaking no longer necessary. An open wholesale model requires the most thorough overhaul and is characterized by a single integrated telecom network, on which several companies join and compete. This model takes advantage of economies of scale and breadth as much as possible.

Within a number of these models, different variants and combinations are possible. These variants are briefly described where possible.

5.2 The status quo: the Concession Model

The current system is included in the WTv BES27. This concession system means that a concession is granted to the telecom providers, provided that they comply with their legal obligation to deploy and maintain a telecommunications network and that they offer the assigned services under the conditions set. The RDI and the ACM supervise compliance with these requirements by the CHs. This status quo has already been set out in section 2.1 and proposals to mitigate gaps in the current framework have been identified in chapters 4 and 5. In this section, this status quo is further placed in the context of market regulation for reference.

Retail status (quality, choice and price)
The concession system ensures that the assigned services are available and meet certain quality requirements at retail. On the other hand, in most cases there is little or no competitive pressure to improve supply or to implement innovations. For example, on the Windward Islands there is only one provider of fixed and two of mobile telecommunications services. On Bonaire, the competitive pressure is slightly higher, with two providers of fixed and three of mobile telecommunications services. Although CHs have an intrinsic motivation to improve the supply and in most cases CHs also use their own capital for this purpose, investments and upgrading of the networks are largely driven by subsidy schemes. Where investments are made independently, this is often characterized by local collaborations (with, for example, local energy companies or governments). The problem that parties encounter is that the investments are relatively high given the scale and location. Partly because of this, they have little buyer power, expertise and capital. Network equipment and associated support must therefore be purchased at a high price, and the help of external parties must generally be called in for the roll-out and upgrading of telecom networks.

CHs have vertically integrated fixed and mobile networks and have no incentive to share networks with alternative retail providers. There is currently no entry on the networks of the integrated providers. On the one hand, this can be explained by the limited scale of the individual networks, but also by the CHs, wholesale access is not actively offered. Retail competition (and therefore the choice for local consumers and businesses) is therefore relatively limited.

Status of concessionaires and governments (local, economic and legal)
The current policy framework is outdated or has a limited shelf life due to advancing technology and market dynamics, among other things. Two implications: regulation does not fit with technology and constant adjustments lead to uncertainties and unexpected circumstances for CHs.
For example, the recent introduction of new services by CHs, such as *Fixed Wireless Access* (FWA) on St. Eustatius, has proven to be difficult and time-consuming. In addition, Starlink's entry into the Caribbean Netherlands is also characterized by ambiguities, both for end users and competing providers. This will probably also apply to the introduction of new (currently unforeseeable) telecommunications services or parties.

CHs note that the current concession model leads to high supervisory burdens, which have also recently been increased by the introduction of the BARC and the potential increase in supervisory burdens that may result from this.

5.3 General authorisation

A theoretically possible model is to replace the concession model with a system of general authorization, or the pursuit of regulated liberalization of the CN

[27] Rijksdienstcn.com, https://www.rijksdienstcn.com/economie-klimaat/rdi/wet--en-regelgeving.

telecom market. In such a system, anyone is free to offer telecommunications services in the Caribbean Netherlands after having registered as a provider of a public electronic communications service or network.

The concession conditions that currently apply to CHs could then be replaced by universal and service-specific obligations, similar to the system set out in (Article 12 et seq. of) the EWEC Directive EU 2018/1972 (the Telecom Code). From a purely administrative point of view, this would make entry into (part of) the market in the Caribbean Netherlands considerably easier and less costly for new parties, as they would not have to obtain a concession and would not have to pay any supervision costs per connection. If new parties were to join, end-users would have a wider choice and this could lead to lower prices due to an increase in competitive pressure. Whether and to what extent accession will take place is still unclear and will be investigated before this model is chosen. However, entry without open wholesale access, with the exception of satellite internet, is very unlikely given the market conditions due to the required high investment costs and payback periods. In advance, this policy option therefore seems to offer opportunities mainly to providers of satellite communications, because they have to incur fewer costs for the roll-out of their network.

Securities

Possible advantages of this system are a strengthening of competition in the medium term, which may result in more innovation and improvement of the retail offer, for example through the introduction of satellite Internet access providers. However, in the longer term, this system may be detrimental to existing market players because there is a risk that the existing networks will be outcompeted as a result of *cherry picking* by these satellite providers. Less profitable services provided by the CHs, such as voice and connection of remote households and businesses, would also suffer from the consequences in that scenario. Incidentally, it is expected that voice will be offered by satellite providers in the future. A *winner-takes-all* situation may arise, in which one party with a lot of economies of scale and capital strength remains from the competitive battle, in which that party has free rein to set monopolistic rates after the exit of the other competition and no longer has an incentive to improve the price-quality ratio. This risk exists especially in areas where the price difference between internet access across the satellite and over fixed networks (as is currently the case in St. Eustatius, for example). When all economies of scale and breadth are concentrated in one provider, it must be ensured that these advantages are largely passed on to end users in terms of lower price and/or better quality. When this monopolist is in private hands, regulation of price and quality is crucial. Where a single public party remains, this requires good management.[A 28]

If local CHs are effectively pushed out of the market, the accessibility of telecommunications would be put under pressure, with geostrategic risks due to dependence on a private satellite internet provider based abroad.

Some of the risks to accessibility with regard to the *winner takes all* scenario can possibly be mitigated with the designation of a (separate) universal service provider on each of the islands. To maintain switching options, subsidizing the universal offer is probably a condition, for example through targeted input subsidies (section 3.3). Subsidies on the demand side have the risk that they mainly accrue to the *winner* , which does not contribute to maintaining diversity of supply and reducing dependency. All in all, this model in the long term, therefore, a lot of uncertainty in view of the risks outlined above.

[28] If this market regulation model is applied, it therefore seems desirable to combine it with price regulation in the long term, as described in section 5.4.

Feasibility

The general authorisation model is unlikely to lead to an improvement in the value for money in CN, as there is in fact little change in the costs of the providers. In addition, the scale of the sales market remains as small as ever.

Although this model is legally possible and can offer advantages, there is a risk of adverse economic effects and thus resistance among local CHs and local authorities, especially in the case of the *winner takes all* scenario. Given the small scale of the islands and the expected introduction of internet over satellite, the question is whether this model will be beneficial for consumers in the long term. The designation of the universal service provider would in the case of the
BES islands can be assessed as an unreasonable burden, with the result that the net costs must be borne by all market parties or must be paid for from the general funds.

Legal

To implement such a model, current laws and regulations must be completely repealed and revised. The model described here deviates from the concession system to such an extent that its introduction probably requires a (very) thorough adjustment of the WTv BES and associated subordinate regulations. The advantage of the agreements with the European telecom framework is that parts of this existing system can be taken over and adapted if necessary. From a European law point of view, the Caribbean Netherlands has the status of Overseas Countries and Territories (OCTs),
as a result of which they are not part of the European internal market and EU law is not directly applicable. Although unlikely, the theoretical conversion of CN status into that of an outermost region (UPR)[29] would formally mean that European legislation would apply there, in principle including the European telecoms framework. The implementation of the Telecom Code EU 2018/1972 could possibly be arranged separately from the Telecommunications Act for CN. If the CN can be aligned with the European acquis communautaire, this will also offer advantages in terms of regulatory foreseeability and less specific specialist legal expertise in supervision and enforcement, tailored to local circumstances.

Part of the European telecom framework is the designation of a Universal Service Provider (UD). Applied to CN, the introduction of such a system would make it obvious that one CH per island would be designated to provide universal service.[30] This universal service
can consist of a basic internet connection (fixed or mobile) in the context of universal accessibility

[29] Under Article 355 TFEU, the European Council, on the initiative of the Member State concerned, may extend the status of a Netherlands OCTs.

[30] As an indication, the basis for the UD offer in EN is explained: The starting point for the regulation of the UD in EN is the European Telecom Code. For the imposition of universal service obligations in the EU, various conditions must be met on the basis of Article 86(1) of the Telecom Code.
First of all, the Member State must take into account the results of the mandatory geographical survey of the coverage of electronic communications networks capable of providing broadband services (Article 22(1) of the Telecom Code). From the results of this investigation and, if necessary, additional evidence, it should be concluded that the availability of adequate broadband internet access services and voice communications services at a fixed location cannot be ensured in normal commercial conditions or by other potential public policy instruments on national territory or parts thereof. If the above is the case, the Member State may impose appropriate universal service obligations to meet reasonable end-users' requests for access to those services. The regular procedure for appointing a company to provide the assistant professor is laid down in Article 9.2 in conjunction with Article 9.2 of the Convention. 9.3 Tw. This judgment is initially up to the Ministry of Economic Affairs. After this, ACM (at the request of the Ministry of Economic Affairs) will determine whether the designation of the company may constitute an unreasonable burden for the designated universal service provider. If there is an unreasonable burden, the costs are either borne by all telecom providers or covered from general funds.

available at a set rate. The current end-user subsidy scheme can be replaced by such a UD system when it expires.

5.4 Retail price regulation

Based on the BARC, a flexible form of tariff regulation currently applies. Here, CHs are bound by the obligation to increase the ARPU of commissioned services annually by a maximum of 1.25 x CPI. In early 2024, ACM consulted a supervisory strategy in which ACM sets out how it intends to shape the supervision of this obligation.

However, other models of price regulation are possible. This could include, for example, the setting of tariff caps on retail tariffs. For example, in the Caribbean Netherlands, ACM has been stating since 2015, which takes into account the costs of energy companies and the affordability of energy and drinking water for customers.[31][32]

Retail price regulation does not change local conditions such as the limited scale, the remoteness of the locations and the high costs both on and off the islands. It is therefore questionable whether regulating retail charges on the basis of costs will lead to a substantial reduction in charges (both in the short and long term). However, limiting CHs' margins by setting retail prices on a strict cost basis could potentially lead to a limited reduction in prices in the short term.

Securities

The potential benefits of this system are a possible short-term improvement of the current retail offer (if the regulated maximum retail tariffs were to be lower than the current ones). The market for fixed and mobile telecommunications services, in contrast to the market for mobile telecommunications services, is drinking water and energy, however, are characterized by a high degree of dynamism. New technologies and services are constantly being developed. As a result, CHs have to constantly invest in their networks and services. If CHs' margins were substantially limited by retail price regulation, such a model would be unlikely to allow them to continue independently without proper safeguards in the quality of their networks and services.[33] At the moment, there are already no retail-only parties active and without additional strict wholesale tariff regulation, potentially interested wholesale customers would be even worse off. These circumstances, combined with retail tariff regulation, make it unlikely that a wider retail offering would emerge under this model. Although CHs are still expected to be able to achieve a reasonable return, there may be a risk of a decrease in supply due to the limited margins of CHs and subsequent exit by the current CHs without the right safeguards, for example in the form of subsidies.

Feasibility

If only the current tariff regulation from the BARC were to be tightened, without the additional legislation and regulations being tightened, the necessary adjustment to the current legislation and regulations would be relatively limited.[34] This therefore seems to be possible in the relatively short term.
However, a lot of capacity is needed (on an ongoing basis) from the competent authority to determine the conduct of any proceedings following the setting of tariffs. In the

[31] Cf. BES Electricity and Drinking Water Act and https://www.acm.nl/nl/caribisch-nederland/tarieven-drinkwater-caribisch Netherlands.
[32] NB: the possibilities for market forces for energy and drinking water on the BES are difficult to compare with those for telecom due to technical and economic differences.
[33] This could possibly be stimulated by additional subsidies for the deployment of infrastructure.
[34] The WTv BES offers the possibility of establishing general guidelines with regard to, among other things, tariffs, on the basis of Article 7, paragraph 2, under the Act.

Calculating the tariffs would have to take into account investments, which requires (much) more capacity from both the regulating party and the CHs. Setting maximum telecom retail tariffs requires far-reaching juridification and will inevitably lead to proceedings in which decisions are challenged, which may require an increase in the staff capacity (number of FTEs) and budget of the regulator compared to the current situation. The question is whether the
revenues in terms of consumer welfare outweigh the additional administrative burden.

Locally, this model can certainly meet with great resistance. The CHs are likely to be significantly restricted in independence and entrepreneurial freedom. In addition, there is a risk that their margins may be restricted too much, making proposed investments unprofitable, even in the very long term. If this would create a significant *investment gap* (gap that arises between the actual investments and the available capital), this would also be undesirable for the quality
services to the local population and businesses.

Legal

In principle, this model can be fitted into the existing legal framework. Article 7, paragraph 2, under d of the WTv BES offers the possibility to establish general guidelines with regard to *the rates*. In the existing Decree on General Guidelines for Concessionaires, retail rate capping can be regulated as one of the guidelines. In addition, procedural rules should be laid down in connection with the tariff decisions, as well as a detailed system regulating how
The costs of, for example, assets and (future) investments are calculated.

5.5 Integrated open wholesale model

5.5.1 Introduction

In the long term, a merged open wholesale network can be promising for the creation of a telecom market that works optimally for local residents and businesses. This model requires the most modifications and has two pillars, namely cooperation and eventual integration of the various passive and active networks for wholesale access to the active layer, and opening up the networks to retail competition. This model offers the opportunity to benefit as much as possible from economies of scale.

A centrally controlled open access network can offer greater freedom of choice and a wider range of end-users in the most ideal circumstances and compared to other models, combined with greater control over the network, efficient centrally controlled deployment, and broad accessibility and availability of telecommunications services. A possible broader retail offer could provide
for more choice, a more customer-oriented range of services, and a better offer because competing providers keep each other on their toes.[35][36] Central coordination of networks can prevent inefficient duplication and overbuilding of network components and promote efficient use of scarce resources. Ideally, the threshold for service providers to enter the market and compete on price and quality throughout CN can ideally be made as low as possible. Various parties have indicated that they see advantages in such a model or that they want to offer services on a single wholesale network.

At another scale level, such a model *(single wholesale network, open wholesale model,* or *open access network)* applied in different countries and scenarios. In Sweden, for example, the centrally deployed and managed fiber optic network Stokab37 has been a great success, which has expanded

[35] OECD, "*Broadband Networks and Open Access*", 2013, http://dx.doi.org/10.1787/5k49qgz7crmr-en.
[36] Internet Society.org, *Ensuring Sustainable Connectivity in Small Island Developing States*, 2017, p. 29, https://www.internetsociety.org/wp-content/uploads/2017/08/ISOC_Small_Island_Developing_States-201706015.pdf.
[37] Stokab.se, https://stokab.se/en/stokab/about-us.

from Stockholm to the wider area, and on which more than a hundred providers offer services. In Liechtenstein38, the national energy company has also successfully rolled out an open fibre network, and in Australia, the central government is rolling out the open National Broadband Network[39] .

Mobile networks with similar models have also recently been rolled out centrally. For example, a national 5G network with an open wholesale model and reference offer has been and is being rolled out in Malaysia and Mexico on which service providers can compete with each other.[40] [41]

5.5.2 Integratie telecomnetwerken in single wholesale provider

In the long term, the various telecom networks in the Caribbean Netherlands could work together in a consortium in different steps and grow into a single wholesale provider (SWP), which offers various essential parts of the production chain. This model lends itself to a step-by-step approach and can also vary in size. Broadly speaking, the following steps can be distinguished: (i) integration of the fixed and/or mobile networks on the islands in the Caribbean Netherlands, (ii) inclusion of "state sea cables", (iii) inclusion of local exchange hosting/caching and (iv) possibly inclusion of the fixed and/or mobile networks on the CAS islands.

(i) Initially, the current different fixed telecommunications networks and/or mobile telecommunications networks with a different market organisation could start to cooperate in the SWP with a uniform network strategy aimed at full coverage and wholesale access. Collaboration at the time of rollout may provide the economies of scale and buyer power of a composite or collaborating entity.

Technically, this SWP would be engaged in the central purchase, development and maintenance of both the passive layer of the fixed and mobile networks, the production of a uniform active layer and the provision of wholesale broadband access to potentially interested retail providers (section 5.5.4). All CHs can purchase fixed and mobile wholesale access on the SWP's network, which allows them to continue to serve their existing customer base, among other things.

Many variants of the governance structure are conceivable for merging and integrating the various networks. Since the shares of Satel, Eutel and Telbo are held by the Public Entities on Saba, St. Eustatius and Bonaire and SSCS is a state participation, coordination with the Public Entities and the Ministry of the Interior and Kingdom Relations is a necessity. Insofar as it is decided to include the fixed and mobile networks on the privately owned islands in the SWP, cooperation with the shareholders of these networks will have to be examined

Given the local differences between the CN islands and the concessionaires, it is probably desirable to set up such an entity (the SWP) not with immediate effect but as a growth model. For example, the cooperation and coordination between the various incumbents can first be increased in a partnership. For example, the CH could share expertise at an early stage, collaborate on the rollout and procurement of an equivalent telecom infrastructure and coordinate business processes. At that stage, it is also possible to work towards a uniform wholesale access model.

After cooperation and coordination has been increased, the various networks could then also be integrated step by step (instead of immediately completely) into a consortium or

[38] Llv.li, *Factsheet Open Access Fibre Rollout Liechtenstein*, 2024, https://www.llv.li/serviceportal2/amtsstellen/amt-fuer-kommunikation/factsheet-open-access-fibre-rollout-liechtenstein_e.pdf.
[39] Infrastructure.gov.au, https://www.infrastructure.gov.au/media-communications-arts/internet/national-broadband-network.
[40] Digital-nasional.com.my, https://www.digital-nasional.com.my/about-us.
[41] Dean Bubbly, *Mobile networks & wholesale*, 2024, Mobile networks & wholesale: lessons from FTTP & open access, LinkedIn.

Holding Company. For example, the networks in Saba and St. Eustatius are geographically a lot closer to each other than the networks on Bonaire, so it makes sense to initially merge the Windward networks.

It should be noted, however, that the positive effects of such a consortium will only be fully expressed when a comprehensive telecom consortium (fixed and mobile throughout the Caribbean Netherlands) is set up, in which all potentially interested access customers can offer services on all islands by means of a uniform offer and a single information point. For example, the merger of the networks on Saba and St. Eustatius alone will lead to only very small economies of scale and breadth. Also, an island consortium for fixed and mobile seems undesirable in the long term, given the major efficiency benefits that result from a fully integrated network including backbone, connection network, masts and other infrastructure components, as well as being able to offer customers combination bundles with both fixed and mobile services (i.e. *quad-play*).

(ii) Following or during the initial cooperation, the current (and possibly future42) sea cables of state-owned companies could also be integrated into the SWP. From a coordination and efficiency point of view, this will become more interesting as more state sea cables are rolled out in and to the Caribbean.

(iii) A further interesting addition to an integrated telecommunications network in the Caribbean Netherlands could be local internet exchanges (IXP) and locations for caching and hosting of data. By hosting content (e.g. Google and Netflix) locally in the CN Islands (instead of the exchange in Miami or elsewhere in the world), IP transit costs for local telecommunications providers can be significantly reduced. By shortening the distances and number of hops from end users to other end users and CAPs (content and application providers), the quality of services from a consumer perspective can be greatly improved (especially latency). In addition, local internet exchanges on the CN islands can also offer telecom providers on adjacent islands an interesting alternative to the common internet exchanges (such as Miami), which offers wholesale opportunities.

Although a very far-reaching step, (iv) from the point of view of economies of scale and breadth, it could possibly be aimed at integration or cooperation with the mobile and/or fixed telecommunications networks on the CAS islands, such as Aquatel on Curaçao, Telem on St. Maarten, and Setar on Aruba. The scale thus achieved would significantly increase the economies of scale and breadth and make entry to the network more attractive for service providers. So
Curaçao alone has more than three times as many inhabitants as the whole of the Caribbean Netherlands. In 2023, Curaçao received more than 625,000 tourists and Aruba received about 1.24 million, numbers that contribute significantly to the potential shared market. Economically, this model also seems to be able to offer many advantages. Parties involved on these islands have also indicated these advantages that they may be interested in such a model. Legally and politically, however, implementation is likely to be a lengthy and intensive process, given the political difference between the CN and CAS islands. Membership by the CAS islands might require cooperation on the basis of the voluntary and willing nature of the shareholder governments of the islands.

5.5.3 Integration of telecom with energy

In addition to the integration of various telecommunications networks, it would also be possible to integrate the telecom and energy networks. The benefits of this integration are likely to be limited, partly because the CHs and energy companies are already working together on deployment and maintenance in the form of
shared physical infrastructures.[43] Such cooperation can easily be done in another way

[42] Rijksoverheid.nl, Pioneer, *Research into Data Subsea Cables: Enabling Caribbean Netherlands digitally*, 2024, https://www.rijksoverheid.nl/documenten/rapporten/2024/09/23/bijlage-2-research-into-data-subsea-cables-enabling-caribbean-netherlands-digitally.
[43] At the time of the investigation, there were different forms of cooperation between the islands. In almost all cases, civil works are shared. On Saba and Bonaire, work is coordinated between the telecom

should be encouraged. The change management required for the integration of the network operators, which varies widely in the core activities and challenges, does not seem to outweigh the potential synergy benefits. However, in the example of Liechtenstein, the national fiber optic network has been successfully rolled out by the national energy company, and in Curaçao, the local energy company (Aqualectra) is linking an open access FTTH network to the overcapacity of the fiber optics already present in the energy network.[44] The possible synergy benefits that can be achieved by combining the companies probably only apply in a greenfield situation where an FTTH network has not yet been rolled out.

5.5.4 Access regulation

One of the most important conditions for achieving optimal retail competition in such an integrated market organisation model is that (regulated) wholesale access to the integrated network is offered to service providers under conditions and tariffs to which they can join.

Such access regulation can be designed in various ways. Both with regard to the location at which access can be purchased, the technical service that can be purchased and the rates that apply to this service(s).

Fixed access regulation

Given the still limited scale and location of a possible integrated telecommunications network in the Caribbean Netherlands, which inherently creates barriers to entry, it could be argued that the barriers to entry should be kept as low as possible with regard to the chosen regulated form of access.

Therefore, central access to telecommunications networks appears to be a workable option. These wholesale broadband access services (WBT) at central level are characterised by fewer differentiation possibilities than (virtually) unbundled access services, but also lower barriers to entry as only one or a few central points need to be rolled out to achieve full coverage on all islands. In the past, fixed telecommunications networks in the European Netherlands often relied on (virtually) unbundled access services to copper and fibre optic networks for regulated wholesale access. In principle, this passive form of access gives access buyers the most differentiation options. In addition, in theory, this form of access also encourages access customers to invest in their own entire telecom network (*ladder of investment strategy) after reaching a certain scale.*

Over the years (due to the upgrading of copper networks and the roll-out of shared infrastructure (*Point-to-Multipoint)* fiber optics), this form of access became less suitable for network owners. As a result, virtual unbundled (VULA) access is often offered on these networks. This active wholesale service can be designed so that access customers have the same differentiation possibilities as on the basis of physically unbundled access.

The disadvantage of (virtual) unbundled access for access customers is that there are considerable costs associated with the purchase of these services. For example, multiple local access locations on different islands must be rolled out for full coverage.

Mobile wholesale access

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and energy networks, while on St. Eustatius, for example, streets are successively opened several times for work on telecom and energy networks respectively.

[44] Antilliaans Dagblad, *Green light for Telecom branch Aqualectra*, 2023, https://antilliaansdagblad.com/nieuws-menu/27458- green-light-for-telecom-branch-aqualectra.

Access regulation in mobile markets is less common, but can certainly lead to more efficient use of the network and a better mobile offer (especially on the Windward Islands). An open access model on mobile can be offered access at different levels. The difference is in which infrastructure is shared. In the most basic form of mobile sharing, masts,
passive antennas, other physical infrastructure and backhaul are shared. (On the BES, masts are usually shared at the moment.)

In a more far-reaching form, a merged network can also share the active transmitting equipment of the Radio Access Network (RAN), optionally in combination with spectrum sharing. The most far-reaching form concerns core sharing, where (in fact MVNO) providers only offer services. For a central network on the Windward Islands, the most interesting option seems to be a model in which the composite entity manages a mobile network as a *single wholesale network* (SWN), and thereby provides wholesale access to different providers at cost. On Bonaire, the mobile market with three players is currently sufficiently competitive. It can be consulted whether, in the long term, after the establishment of a SWN on the Windward Islands, there is a need for a form of mandatory MVNO access, so that participating mobile service providers can serve the entire CN.

Wholesale tariffs and access regulation

In addition to the technical form of access and location of the (regulated) wholesale access, there are also various options for arriving at the wholesale tariffs. For example, it can be decided to regulate the rates strictly on costs. This is likely to result in the lowest wholesale charges, but also the lowest margins for the integrated entity. Other forms are also possible (e.g. different incremental (BU)LRIC cost models), where the access entity enjoys a little more freedom of movement. (This form of wholesale tariff regulation is most commonly used in practice in the EU).

In any case, it is essential for effective wholesale access that the wholesale provider publicly discloses the tariffs, conditions and technical specifications for access in a transparent, up-to-date and clear reference offer. Where the wholesale party itself also offers retail services, it is required that there are good guarantees for non-discrimination downstream, whereby access seekers may not be disadvantaged vis-à-vis the retail branch of the wholesale provider.

5.5.5 Effects and feasibility

Securities

By integrating the fixed and/or mobile telecommunications networks on the various CN islands, economies of scale and breadth can be taken advantage of. In addition, cooperation throughout the Caribbean Netherlands could also be significantly improved.

Retail competition is currently very limited in the Caribbean Netherlands. There are no access takers active in the whole of CN and in fact no wholesale access is offered to the retail networks. This situation is not expected to develop into a more competitive market, apart from the entry of satellite Internet providers. By making it easier for access customers to offer services on all islands within the Caribbean Netherlands, it can become more attractive to offer services. Both for the current providers in CN and for possible new entrants. That is all the more so if the wholesale costs of entry into this integrated telecommunications network were regulated at the cost level. This would ensure that consumers can take full advantage of a potential reduction in costs for telecom providers by improving efficient retail competition.

Feasibility

In order to implement an integrated open access network, both the laws and regulations and the market structure in the Caribbean Netherlands must be completely revised. It requires a lot of capacity on the part of the legislator, policymakers, the public entities, the CHs, and regulators to implement this model.

In addition, the effectiveness of this model depends to a large extent on the willingness of the current CHs to become part of this entity, and the extent to which new entrants might want to purchase access to the integrated network. The interests of the Public Entities on Bonaire, Saba and St. Eustatius as shareholders in the CHs must also be respected.
ACM has informally assessed whether this willingness exists. Although this is of course surrounded by uncertainties, most CHs do appear to see advantages of such a model, depending on the specific conditions. The reduction of costs and the possibility to significantly expand coverage relatively easily are seen as the biggest advantages. It is recognized that in this way it is probably also better to compete with new entrants to the market such as Starlink. If there were attractive access conditions and tariffs to the integrated network, ACM therefore considers it plausible that there would be more choice and competition than in the status quo. The main disadvantage is that people want to lose as little control as possible over their 'own' telecom provider. As a result, the current CHs would prefer that the management of such a network be in the hands of a consortium (of which they are a part), rather than in the hands of a single (possibly external) operator.

Legal

This model requires a comprehensive review of the current WTv BES and related regulations. In the first place, the WTv BES should be adjusted with regard to the methodology of concessions. Instead, one wholesale network operator and an unknown number of retail parties should be assumed. Separate rules would apply to both categories. The wholesale provider offers access to and has the associated (access) obligations (paragraph 5.5.3), requirements for the reference offer and the tariffs, and quality requirements with regard to the network and the service to access customers. Universally applicable requirements could be imposed on retail providers in relation to the
consumer protection, numbers, emergency calls, etc. Finally, it should be noted that good governance, internal supervision, and transparent governance of any merged wholesale entity are of great importance.

Table 2: Overview of market organisation models

	Model marktordening			
	Concession system (status quo)	**General authorisation**	**Retail price regulation**	**Single Open Access model**
Quality	Is slow (whether or not not by means of subsidies)	Risk of low Investment dot In the long run term	Can the investment Remmen, India Margins too much be limited	Stimulates investments in (improvement and extension of) networking by Publishing costs en Bundling expertise
Choice	Different Mobile and fixed (Bonaire) Network providers No wholesaletoegang (fixed and mobile)	In the short term more providers, with long-term Term (risk of) impoverishment offer	Possible decrease in offer by limitation of margins risk of withdrawal current CHs.	Probable increase in Competitive offer by joining Retail providers Effect can probable significantly if also St. Maarten, Aruba en Becoming Curaçao concerned
Price	High copper prices are slowly replaced by glass with better p/c ratio.	After initial Verlaging Door Accession, later risk of increase to Monopoly prices	Possible reduction in the short term, Indian Tariefceiling under the current retail rates.	Verwachte verlaging due to an increase in Retail competition I.C.M. Verlag costs for both Potential retail providers such as Network owner(s)
Local	Complex System Outdated model with high Supervisory burden	A lot of resistance from Concessionaries and Shareholders	Strict supervision of Retail calls probable resistance at both the local 'CH's as governments	Zolang local telco's and governments are (in the case of consortium) this looks broad support to be able to count Entrepreneurs in St. Maarten in Curaçao would like to participate
Economic	Few scales and Breadth benefits	In the long term Risk of winner takes-all scenario.	Limited margins Network owners No Cost Publishers effects for Network owners	Most scale and Breadth advantages. Increase buyer power. Publishing costs encourages accession, but scale remains unless CAS islands are added.
Legal	Outdated and fragmented and regulations that continuous be customized to the last developments	Mainly Revoke current legislation and regulations. Supplementary Quality may be needed.	Adaptation tariff regulation (part of BARC) is possible. Asks for supplementary schemes and procedures concerning cost assessment and rates.	Requires thorough revision policy framework and possible transfer of shares. After that probably well future-proof. Inclusion networks St. Maarten in Curaçao Legally complex. Requires far-reaching cooperation with BT&P / RAC.

6 Conclusions

The telecom markets in the Caribbean Netherlands (CN) have developed positively in recent years. For example, the digital infrastructure in CN has improved since 2010, the price-quality ratio has improved and telecom providers continue to invest in improving the fixed and mobile networks.[A 45]

At the same time, challenges remain due to the high costs faced by concessionaires. These (inevitably) high costs are mainly the result of the geographical location of the islands and the small scale of the local telecom markets. The high costs are passed on by the concessionaires in the end-user tariffs, which therefore have an unfavourable price-quality ratio compared to those in the European Netherlands. In most cases, end-user tariffs have been compensated by subsidies in the past period. The islands are currently too small as a telecom market on their own and have too complex a geographical location to deliver a thriving market with low prices from independent trading. It is therefore important to investigate whether promoting competition in CN is feasible, given the limited scale of the islands. The answer to this question determines which market organization model can best be applied in practice.

At the same time, more can be taken advantage of the economies of scale and breadth by encouraging mutual agreements between market parties on the islands and thus saving costs (see sections 3.4, 4.2 to 4.4 and 5.5). In this context, ACM has been commissioned by the Ministry of Economic Affairs to investigate possible models for regulating the telecom market in the Caribbean Netherlands (CN) that can be used to strive for a better price-quality ratio of telecom services for end users. In this report, ACM describes various policy proposals based on its experiences as a telecom regulator in the European and Caribbean Netherlands.

In the short term (see Chapter 3), there is the possibility of promoting the sharing of physical infrastructure and the coordination of civil works in CN. Examples include masts, sites, outbuildings and street cabinets. Sharing physical infrastructure could be beneficial for reducing the costs of deploying fixed and mobile networks. In addition, there are possibilities to connect public WiFi hotspots to available networks on the islands, for example to networks of local government buildings and utilities. This could contribute to connectivity on the islands and is beneficial for end-users who have difficulty with the affordability of fixed or mobile services. A third possibility concerns the adoption of subsidy measures to finance procurement costs.

In addition to these possibilities in the short term, there are also possible adjustments that can have an effect in the medium term (see chapter 4). The introduction of number portability on the islands can contribute to a better functioning of the market in the mobile telephony market. Also there are possibilities to control the costs of international roaming for end-users, for example, by aligning CN with the European Roaming Regulation or by encouraging international roaming agreements between the Caribbean islands. In any case, the aim is that a SIM card from one of the islands can be used for roaming throughout the Caribbean Netherlands without additional costs for end users, and vice versa. In addition, ACM describes the possibility of control the costs of connectivity to and from the islands, and regulate interconnection with sea cables. With regard to state-owned holdings in particular, ACM sees opportunities to improve the situation to the advantage of the CHs of the CHs and ultimately of the inhabitants of the

[45] Amsterdam Bureau for Economics, *Report on Digital Infrastructure Caribbean Netherlands*, 2023, https://open.overheid.nl/documenten/1ed13c34-a4bd-4ac5-80e8-88030e4c1d5a/file.

islands. In this way, risks for the CHs in terms of dependency and availability are limited. A fourth possibility is to define the assigned services in the BOT *in an infrastructure-neutral* way. This means that dedicated services are disconnected from a certain infrastructure, as is now laid down in the BOT. This change in the law can lead to more innovation and willingness to invest among (telecom) companies. The last possibility in the medium term concerns the exemption of commissioned services from ABB (tax) and supervisory costs in order to reduce the administrative and tax burden of CHs.

Currently, the current system has a concession system. It is possible for the CH to roll out and maintain a telecommunications network and to offer commissioned services under conditions set out in a concession. The concession system has a limited shelf life due to advancing technology and dynamics in the market, among other things. As a result, regular adjustments to regulations are necessary. These ongoing adjustments lead to legal uncertainty and unexpected circumstances for CHs.

A first conceivable alternative to the concession model is a system of general authorization. Such a system may lead to an increase in competition in the medium term, which could lead to more innovation and an improvement in the retail offer. Nevertheless, a system of general authorization has potentially adverse consequences in the long run, because local networks can be outcompeted by satellite providers as a result of *cherry picking* by parties with *economies of scale*.

Another model involves retail price regulation in CN. Possible advantages of this system concern an improvement of the current retail offer in the short term. However, if CHs' margins are limited by retail price regulation, such a model would unlikely allow CHs to continue to invest independently in the quality of their networks and services

The latest market regulation model concerns a central open access network. This model is a merged open wholesale network, in which the different networks are integrated and the networks are opened up to service providers. Potential advantages with this system are the economies of scale and breadth, which should result in wide accessibility and availability of telecommunications services.

However, an integrated network represents a fundamental change from the current market organisation and therefore has major implications for the current CH and local authorities. To keep the process manageable, a step-by-step approach is conceivable. In the longer term, the various telecom networks in CN could be merged in steps (see Section 5.5.2). In addition, the current various fixed and mobile telecommunications networks could be merged into a single entity with a different market organisation. An important condition for achieving retail competition in an integrated market organisation model is the provision of (regulated) wholesale access to the integrated network for attractive and profitable conditions and
service providers. Such access regulation can take place in different ways
(see section 5.5.3).

These models are not exhaustive. Some of these models could also be used in combination.

In addition to estimating the effects on the basis of **quality**, **choice,** and **price**, ACM has also tested the feasibility of the market regulation models.

Annex I: Submarine cables in CN

Sea cables in the Caribbean are essential for good connectivity. Almost all international data traffic goes through sea cables. The current situation of the submarine cable systems and IP transit to the internet exchanges at the Leeward Islands and the Windward Islands is explained in more detail below.

Leeward Islands (Aruba, Bonaire and Curaçao)

Bonaire is connected to Curaçao via two different sea cables (figure 1). The Jerry Newton submarine cable has been operated by Cable & Wireless Communications (hereinafter: C&W Communications) since 2007 and is
owned by LLA. The other cable called Amerigo Vespucci is partly owned by C&W Communications (LLA) and partly owned by Telbo. Flamingo is purchasing capacity on both submarine cables.

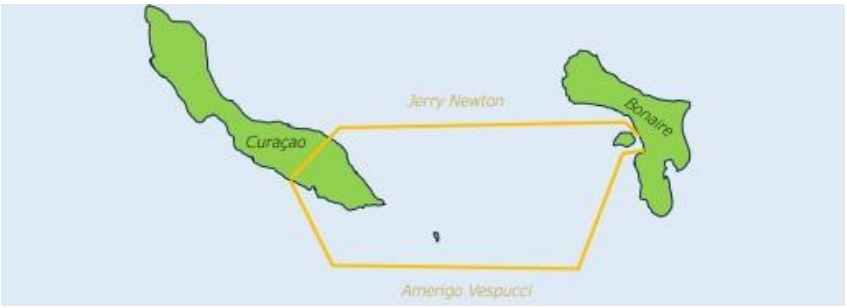

Figure 1: Representation of the course of the two submarine cables Jerry Newton and Amerigo Vespucci (Source: Economic Bureau Amsterdam, 2023)

Windward Islands (Saba, Sint Maarten and Sint Eustatius)

Saba and St. Eustatius are connected with one SSCS submarine cable, which was laid in 2012 by the company Saba Statia Cable System.[46] The SSCS submarine cable connects Saba and Sint Eustatius in the north with Sint Maarten and Saint-Barthélemy and in the south with Saint Kitts and Nevis (see Figure 2). Various parties provide internet capacity on the SSCS cable, including SSCS B.V. itself, Liberty Latin America (hereinafter: LLA) and TelEm Group.[47] SSCS supplies its capacity only to the concessionaires. The same applies to long-distance traffic on St Eustatius as to Saba:
Various parties have internet capacity on the cable.

[46] SSCS B.V. is a cable company in which all shares are owned by the Ministry of the Interior and Kingdom Relations.
[47] ACM, Cost assessment of fixed internet Saba and St. Eustatius, 2020 (ACM/UIT/534075), https://www.acm.nl/sites/default/files/documents/2020-05/kostenbeoordeling-vast-internet-saba-en-sint-eustatius.pdf.

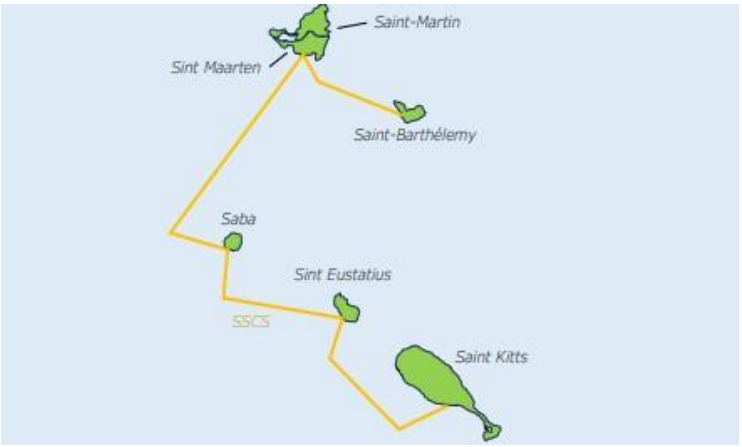

Figure 2: Representation of the course of the SSCS submarine cable (Source: Economic Bureau Amsterdam, 2023)

Not all telecom parties in the Caribbean Netherlands have internet capacity on the above-mentioned sea cables. As a result, some telecom providers have to pay for Internet Protocol transit capacity (hereinafter: IP transit). The rates for IP transit in CN are a lot higher than in the European Netherlands, partly due to the long distances. In particular, IP transit to the internet exchanges in Miami and Jacksonville are currently very expensive.[48] In addition, telecom operators have additional costs due to extreme weather conditions, risk of cable breaks, and failure of network equipment.

In the Leeward Islands, a large part of the sea cable network from Curaçao to the Miami internet exchange is in the hands of C&W Communications. As a result, C&W Communications may charge high rates. For example, both Telbo and Flamingo TV pay rates for IP transit at C&W Communications.

As for the Windward Islands, on Saba, for example, Satel pays high rates for IP transit. For this reason, Satel negotiates with the various parties with IP transit, such as SSCS. Satel usually enters into several short-term contracts with different parties to use pieces of residual capacity. In addition, Eutel has purchased capacity on St. Eustatius, for example, from SSCS for ten years.[A] [49]

[48] Amsterdam Bureau for Economics, *Digital Infrastructure Report*, 2023, Digital Infrastructure https://open.overheid.nl/documenten/1ed13c34-a4bd-4ac5-80e8-88030e4c1d5a/fileur Caribbean Netherlands.
[49] Ibid.

Annex II: Spoken parties

- Ministry of Economic Affairs
  - oh Digital Economy Policy Directorate
  - oh State Inspectorate Digital Infrastructure
- Ministry of the Interior and Kingdom Relations
  - oh Policy Directorate for Digitalisation and Government Organisation
- BT&P St. Maarten
- Regulatory Authority Curaçao
- Public Entity Saba
- Public Entity St. Eustatius
- Bonaire Holding Maatschappij
- Saba Statia Cable System (SSCS)
- Body
- Satel
- Eutel
- Digicel
- Flow (LLA)
- FlamingoTV
- TELBO
- Aqualectra (Aquatel)
- Saba Electric Company (SEC)

Annex III: Glossary (abbreviations and terms)

ABB tax General spending tax ACM Authority for Consumers and Markets ARPU Average Revenue Per User

PARK	Decree on general guidelines for holders of a concession WTv
BES Downwind	Leeward Islands (Aruba, Bonaire, Curaçao)
Windward	Windward Islands (Sint Maarten, Saba, Sint Eustatius) BOT
	Decree on commissioned telecommunications services BES

Ministry of the Interior and Kingdom Relations

CAPs Content & Application Providers CAS Islands Curaçao, Aruba and Sint Maarten CDvhK Caribbean part of the Kingdom of the Kingdom of Curaçao

CN	Caribisch Nederland (Bonaire, Saba, Sint Eustatius)
COIN	Common Infrastructure (association of telecom providers in the Netherlands) D2D	Direct to Device (method of satellite communication)

EBA Economic Bureau Amsterdam

EEA European Economic Area

EN European Netherlands

Ministry of Economic Affairs

FttH	Fiber to the Home
FWA	Fixed Wireless Access

HFC Networks Hybrid Fiber Coax Networks

IP	Internet Protocol
IXP	Internet Exchange
LGO	Overseas countries and territories (island status) LLA	Liberty Latin America
MNO	Mobile Network Operator
MVNO	Mobile Virtual Network Operator
OTT	Over The Top (services offered over open internet) RAN
	Radio Access Network

RDI National Inspectorate for Digital Infrastructure

LINE	Subscriber Identity Module
SSCS	Saba Statia Cable System BV
SWP	Single Wholesale Provider

UD Universele Dienst

UPG	Outermost Region (island status)
VHCN	Very High Capacity Networks
VULA	Virtual Unbundled Local Access
WBT	Wholesalebreedbandtoegangsdiensten

WTv BES Telecommunications Facilities Act BES