



# **DONCO**

## **SUPPLIER FEASIBILITY REPORT FOR BOTSWANA**

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## **Executive Summary**

After a comprehensive and detailed analysis of Botswana in its various dimensions like economic, political and regulatory stability, combined with its existing telecom and internet market, Botswana emerges as a potential candidate for DONCO to explore in order to satisfy and further explore its textile supplier needs in the Sub-Saharan region. Based on the current market regulations and the presence of multiple internet service providers (ISPs), their market presence, financial profile, infrastructure and costs, our recommendations are as follows:

- Supplier locations : Gaborone and Francistown.
- ISPs : BTCL for broadband & Mascom Wireless as a mobile service provider.
- Security : A multidimensional security proposal, comprising physical, personnel and organizational security parameters have been specified so that its potential supplier can ensure continuity and intrusion prevention.

## Country Profile

Botswana is a landlocked country located in Southern Africa. This was a former British colony and gained its independence in 1966. Its capital is Gaborone located at the south in the border of South Africa and is the Largest city in the country. It is also the economic and government capital of the country. The country's entire population is over 2.2 million people with around 10% (231,626) of the population residing in the capital.

Area	600,370 km <sup>2</sup>
Inhabitants	2.2 million
Population Growth	0.9%
Official Languages	English
Capital City	Gaborone
GDP Growth	4.3%
President	Ian Khama
Ease of doing Business	56/189
Currency	Pula: 1 US\$ = 10.3 BWP

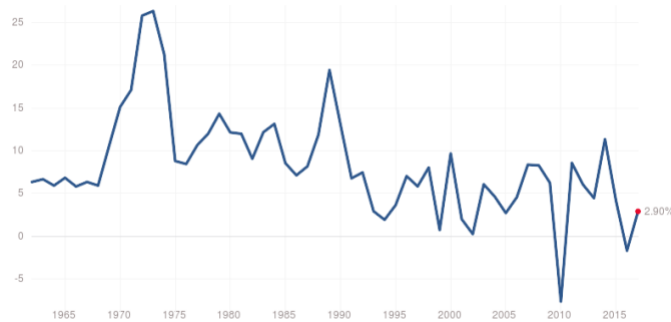
*Source: EIU, gta, doingbusiness.org*

The main language spoken in Botswana is Setswana (Tswana). Other languages spoken include English, Kalanga and Kgalagadi. Being a mid-sized country, it is one of the more sparsely populated country in the world.

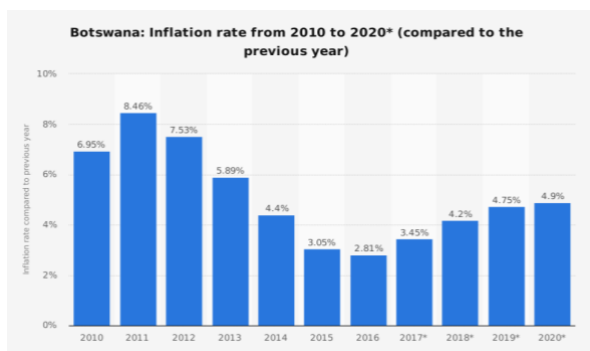
## Overall Economic Prospects

In the 1960's, Botswana was one of the poorest countries with GDP per capita of \$70 per year. Since independence, it has transformed its economy into one of the largest growing ones. Their economy is hugely dominated by mining, followed by cattle and tourism. Now Botswana boasts a GDP per capita of about \$18,825 per year as of 2015, which is one of the highest in the African continent. It is the fourth largest in Africa in terms of gross national income. Also, Botswana offers a stable political, fiscal, and macroeconomic environment.

Although Botswana's economy is experiencing steady growth, GDP growth has been slower than expected, mainly due to decrease of 7% in the mining sector. Botswana's economy is highly



dependent diamond for 80% of its exports. The large diamond mines are open-cast mines, with a high production capacity. However, by 2025, they will reach a depth that will transform them into underground mines, which will result in a decline in productivity. Botswana Diamonds is confident that with the latest technologies and further exploration, new diamond deposits will be found.



Government is trying to diversify the economy, so that Botswana is not so reliant on the diamond industry. The strategy is already proving successful; mining contributes only 15% to total GDP while the service sector contributes 35%. The De Beers group signed a deal with

the Botswana government in 2011 to move its sites and sales operation including professionals, skills, equipment and technology from London to Gaborone, which gave the local service sector yet another boost.

The country is also member of the African Union, Commonwealth of Nations, and United Nations. Although the country is facing many hardships, it has one of the most promising economy and stable government in the continent.

SWOT ANALYSIS	
Strengths	Weaknesses
Investor friendly government and frameworks Politically stable Growing and stable relationship Minimal corruption Close to the industry hub Gauteng	Closest port is 1,000 km away Lack of skilled labour Small market with 2.1 million population Being land-locked affects the exploitation of commodities such as coal
Opportunities	Threats
Commodities Investment opportunities (energy, water, transport, ICT) Diversification of the industry Solar opportunities Population has buying power	Economy too reliant on diamonds Water shortages affect mining and agriculture

# **Telecom and Internet market of Botswana**

## **Regulation Overview**

Botswana's telecoms sector is governed by the Communications Regulatory Authority Act, which replaced the Telecommunications Act of 1996. The converged regulators (known as Botswana Communications Regulatory Authority) assumed responsibility for the regulation of telecoms, Internet, ICT, commercial radio, television, broadcasting, postal services and other related matters. The mandate of BOCRA is to promote the development and provision of efficient telecoms services. The Ministry of Transport and Communications (MTC) coordinates policy development and implementation in the telecoms sector. The Telecom markets were fully liberalized in 2006.

## **Licensing**

BOCRA proposed the implementation of a new Unified Licensing Framework (ULF), which calls for service neutral, and technology neutral licensing horizontally across all communications markets.

## **Infrastructure Sharing**

Guidelines for Sharing of Passive Communications Infrastructure' came into force on 1 April 2012. These guidelines highlighted the need for the joint use of infrastructure such as towers, cable ducts, communications equipment and other facilities, saying that this was vital to increasing competition by bringing communication services to other parts of the country.

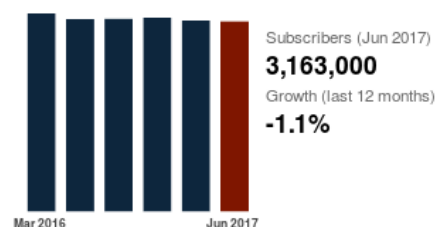
## **Ntelelsa project**

The government's Ntelelsa project was introduced in 1999 as part of its Rural Telecommunications Development Program, with the aim of bringing voice, data and Internet services to rural and underserved areas of the country.

# Overview of Internet and Telecom service providers

## Wireless Overview

Botswana's wireless market underwent steady subscriber growth after the turn of the millennium, leaving the country with one of the highest mobile penetration rates in mainland Africa



## Licensing

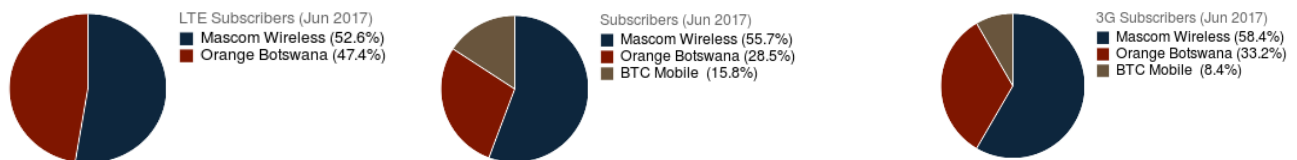
BOCRA awarded 15-year mobile licenses to Mascom Wireless and Vista Cellular (since renamed Orange Botswana) in February 1998. Until August 2006 Mascom and Orange were obliged to use the backbone infrastructure of fixed line incumbent Botswana Telecommunications Corporation Limited (BTCL) to carry traffic. From 1 August 2006 the cellcos were given permission to build their own infrastructure.

The government ruled that BTCL and the two cellos could apply for service neutral public telephony operator (PTO) licences from 1st September. That year BTCL launched wireless operations through its cellular arm BTC Mobile in April 2008, offering a variety of services under the beMobile banner.

In 2003 the BTA imposed interim mobile termination rates (MTRs). MTRs were cut from BWP 0.753 per minute to BWP 0.220 on 1 June 2017, while June 2018 will see another fall to BWP 0.130.

From 31 January 2010 the watchdog instructed operators to begin cutting off unregistered mobile lines, adding that from that date new pay-as-you-go SIMs must only be activated after electronic registration had taken place.

Botswana's wireless market underwent steady subscriber growth after the turn of the millennium, leaving the country with one of the highest mobile penetration rates in mainland Africa, though market saturation has now seen the subscriber total go into decline.



**There are three main players in the wireless market:**

### 1. Mascom Wireless:

Botswana's largest mobile operator by subscribers, with a customer base of 1.78 million at 31 March 2017, down from 1.83 million twelve months earlier. Its licence was awarded in February 1998 and the firm launched its GSM-900 network the following month, with SMS following in 2000. The company is 53.1% owned by South-African based MTN group. Today the company has wide reach in Botswana with their GSM/GPRS/EDGE network covering around 95% of the country's population.

### Subscription Plan:

#### Do more for you business with Mascom mega broadband packages

##### 12 Months Package

MyBusiness Broadband	Price Per Month	Service Fee (Once-Off)	Data (GB) /month	Speed (Downlink)
MyBusiness Broadband - S	P740	P1,071	40	2 Mbps
MyBusiness Broadband - M	P1,365	P1,071	80	4 Mbps
MyBusiness Broadband - L	P1,812	P1,071	120	4 Mbps

##### 24 Months Package

MyBusiness Broadband	Price Per Month	Service Fee (Once-Off)	Data (GB) /month	Speed (Downlink)
MyBusiness Broadband - S	P651	P713	40	2 Mbps
MyBusiness Broadband - M	P1,187	P713	80	4 Mbps
MyBusiness Broadband - L	P1,633	P713	120	4 Mbps



## 2. Orange Botswana:

Orange Botswana won its 15-year GSM licence in February 1998 and launched a GSM-900/1800MHz network the following June. Orange became the second cellco in the country after Mascom to roll out a third-generation network, with this launched in July 2009 and offering maximum download speeds of up to 3.6Mbps. 3G/3.5G services were initially available in the country's two largest cities, Gaborone and Francistown, but were expanded to Lobatse and Serowe in September 2011 and by July 2017 coverage reached an estimated 60% of the population. Presently, its GSM/GPRS network was available across 95% of Botswana.

Offer names	Business Konnecta Basic	Business Konnecta Classic	Business Konnecta Prestige	Business Konnecta Premium
UpFront Fee (with 3G Modem)	P899			
UpFront Fee (with 4G Modem)	P1399			
Monthly Rental (12 month contract)	P479	P849	P1349	P1849
Monthly Rental (24 month contract)	P399	P699	P1099	P1599
Download Speed	Up to 1Mbps	Up to 4Mbps	Up to 10Mbps	Up to 20Mbps
Volume allowance	20GB	35GB	60GB	100GB
Fixed voice tariff	P0.70 per minute for both peak and off-peak time			
SMS tariff	P0.25/SMS			
FUP - Download Speed	Up to 512Kbps	Up to 512Kbps	Up to 1Mbps	Up to 1Mbps

## 3. BTC Mobile:

Fixed line incumbent Botswana Telecommunications Corporation Limited (BTCL), which was known as Botswana Telecommunications Corporation (BTC) until 1 November 2012, was awarded the country's first service neutral and technology neutral public telephony operator (PTO) licence in March 2007, allowing it to provide mobile and fixed telephony and internet services under a single concession. A new arm of the company, BTC Mobile, was subsequently formed, and in December 2007 the subsidiary began testing a GSM-900/1800MHz network.

## Broadband Overview

In general, the fixed broadband market in Botswana underdeveloped. At the end of March 2017 penetration of high speed internet services stood at around 6.4% of total households, considerably lower than the roughly 63% average penetration of countries in the same ‘GDP per capita decile’ economic grouping. Fixed broadband subscriptions totaled only around 40,500 at the end of March 2017, up from the 36,602 reported a year earlier by the Botswana Communications Regulatory Authority (BOCRA).



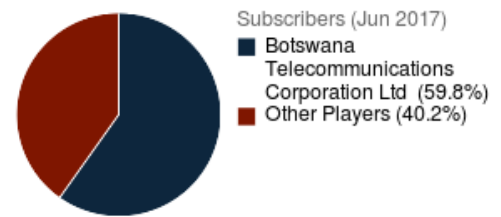
## Reasons:

- (1) low fixed line penetration
- (2) Uncompetitive wholesale pricing by incumbent telco BTCL
- (3) A lack of notable competition
- (4) The absence of electricity and low computer literacy in many households
- (5) The high cost of services and PCs
- (6) The arrival of 3G and, more recently, 4G wireless broadband networks

Previously, BTCL had played the dual role of ISP and bandwidth supplier, giving it an unfair advantage over other operators, but the transfer of the backbone infrastructure from BTCL to BoFiNet in 2012 means that ISPs and telecoms companies are able to openly compete for network and bandwidth supply, driving down wholesale costs and thereby helping to boost end user take-up.

## Service Providers:

- **Botswana Telecommunications Corporation Ltd (BTCL)**
- **Broadband Botswana Internet**
- **MTN Business (Botswana)**
- **Botswana Fibre Networks (BoFiNet)**
- **Orange Botswana**



Only a handful of firms currently offer internet services in Botswana, with BTCL providing the vast majority of ADSL broadband connections.

In a more significant step towards driving down wholesale internet prices, the privatisation of BTCL (see Wireline Profile for further details) has seen another state-owned infrastructure company – Botswana Fibre Networks (BoFiNet)

### 1. Botswana Telecommunications Corporation Ltd (BTCL)

Botswana Telecommunications Corporation Limited (BTCL – previously Botswana Telecommunications Corporation [BTC]) was established in 1980 under the Botswana Telecommunications Act, which incorporated the operator as the sole provider of telecoms services in the country. On 1 November 2012, in preparation for its privatisation, it was converted from a statutory body (BTC) to a public company limited by shares (BTCL), while in 2013 its infrastructure business was spun off to a new entity, Botswana Fibre Networks (BoFiNet). BTC held a monopoly on all fixed line services until the Telecommunications Act of 1996 liberalised the ISP.

Today, BTCL offers dial-up and broadband internet access, domain hosting, e-mail, leased line, VPN and internet development services for residential and business customers. Broadband packages are available from BWP259 a month for a 512kbps fixed connection on a twelve-month contract, up to BWP1,763 for a 20 Mbps wireless service. With convergence central to BTCLs strategy for growth, in November 2008 the company launched ‘brobe’ branded multi-play packages, which bundled fixed telephony, wireless voice and broadband services. November 2010 BTCL launched a new converged offering called ‘Metro’, which provides a range of internet and VPN services to enterprises and service providers over a converged IP/Multi-Protocol Label Switching (MPLS) network.

### Broadband Subscription Plans

Access	Product Name	Speed		Cap/Limit	Set-up Fee	Monthly Cost		Date Observed
		Downstream	Upstream					
DSL	Faster Broadband Residential 2048/256	2Mbps	256kbps	None stated	BWP250	BWP442.00	USD40.67	Jul 2017
DSL	Faster Broadband Residential 4096/768	4Mbps	768kbps	None stated	BWP250	BWP648.91	USD59.70	Jul 2017
WiMAX	Faster Broadband 4Mbps	4Mbps		None stated	BWP250	BWP735.44	USD67.66	Jul 2017
WiMAX	Fastest Broadband 10Mbps	10Mbps		None stated	BWP250	BWP1,170.71	USD107.71	Jul 2017
WiMAX	Fastest Broadband 20Mbps	20Mbps		None stated	BWP250	BWP1,763.32	USD162.23	Jul 2017

## 2. Broadband Botswana Internet (BBi)

Broadband Botswana Internet (BBi) was formed in 2000 when it was awarded a licence for the provision of data and internet services by BTA. This is a private company which offers services over a combination of wireless, ADSL, fibre and frame relay technologies, using both its own networks and infrastructure leased from other providers. A sophisticated satellite earth station was installed in Gaborone, which provides Reliability and independence.

BBI runs and maintains its own backbone and also guarantees a 99.9% uptime under normal operation. BBI have a strategic relationship with Globalstar who is the largest provider of mobile satellite voice and data services. It brings more opportunities since Globalstar offers services in more than 120 countries around the world. Corporates can pay BWP 3,575 for a 4 Mbps link and BWP 2,250 for a 5 Mbps link monthly.

### **3. MTN Business (Botswana)**

MTN Business is the corporate business group of the South African based MTN group which mainly focuses on providing communication solutions to small to large businesses and public sector. The company is 80% owned by MTN businesses in South Africa and 20% by minority shareholders. Today, the group has a point of presence in more than 23 African and Middle East countries.

MTN Business provides the perfect leased-line or Diginet solution by routing internet traffic through its MPLS backbone. It's fast, reliable and secure. Supported round the clock, it's the most efficient network in Africa.

### **4. Botswana Fibre Networks (BoFiNet)**

BoFiNet is a wholly state-owned infrastructure company. It now owns and operates the country's nationwide backbone networks. It deploys its own fibre-optic access networks and announced to begin fibre rollouts in the cities of Gaborone, Francistown, Kasane, Kazungula and Maun by the end of the 2014. It is able to provide faster and cheaper wholesale Internet connections to the country's retail ISPs. BoFiNet boasts more than 9000 km of fiber connectivity based on an SDH and DWDM network.

The rates for BoFiNet which is charged on the basis of distance and contract duration. This provides immense capacity that is able to provide for any customers that require transport networks of impressive size. In February 2017 BoFiNet unveiled a partnership with local ISP CENE Media, which allows customers to gain access at BoFiNet network of Wifi hotspots around the country.

CAPACITY		1 YEAR CONTRACT	2 YEAR CONTRACT
E1	2	835	792
10 Mbps	10	4,081	3,836
DS3	45	18,011	16,931
100 Mbps	100	39,243	36,889
STM 1	155	59,640	56,062
STM 4	622	107,701	101,239
STM 16	2,488	286,272	269,961
STM 64	9,952	765,846	719,895

Point to Point for radial distances GREATER than 250 KM- PROTECTED

## 5. WiMAX (by Orange Botswana )

Cellular operator Orange launched a WiMAX-based broadband internet service in the 2.5GHz frequency band under the brand ‘Livebox’, with equipment supplied by Alvarion. Speeds of up to 1Mbps were made available to 90% of residents in Gaborone, one of the fastest growing cities in Africa. A second network was launched in Francistown in November 2008.

In September 2014 satellite communications provider Globalstar established a partnership with Broadband Botswana Internet (BBi) to construct a satellite gateway in Gaborone. The gateway covers Botswana and surrounding countries such as South Africa, Namibia, Mozambique, Tanzania, Madagascar, Swaziland, Lesotho, Malawi, Angola, Zimbabwe, Rwanda, Burundi and Zambia. Satellite voice and data services are mainly targeted at industries including mining, farming and logistics, though there are plans to also make them available to private users.

## **Wireline Overview**

Fixed line incumbent BTCL, mobile operators Orange Botswana and Mascom Wireless were awarded national, 15-year service neutral and technology neutral public telephony operator (PTO) licences in 2007.

Dates of Liberalisation

- Local Telephony: Sep 2006
- Domestic Long-distance Telephony: Sep 2006
- International Telephony: Oct 2006

In February 2011 the regulator introduced Regulatory Directive No. 1 of 2011 to implement the updated cost model and pricing framework, which recommended that fixed termination rates (FTRs) be increased by an average of BWP 0.01 annually over a three-year period.

On 1 October 2006 new tariffs came into force, with lower international rates but higher local charges. From 1 August of 2006, holders of the new Value Added Network Service (VANS) licences (since replaced by Services and Applications Provider [SAP] concessions) were allowed to offer IP telephony services.

## **Wireline Market competition**

Botswana Telecommunications Corporation Limited is the principal provider of fixed telephony services. Cellular operators Mascom Wireless and Orange are only potential facilities-based competition. Both of them received service neutral and technology neutral public telephony operator (PTO) licences in 2007, which enables them to launch fixed line or fixed-wireless services. However neither operator has expressed any interest in competing with the incumbent in the fixed line telephony market.

Even though the mobile sector is booming in Botswana, the growth of Botswana's wireline market has been hampered by a lack of competition. Since the country's population is sparsely distributed, the installation of fixed infrastructure became both difficult and costly. According to figures from the Botswana Communications Regulatory Authority (BOCRA), BTCL's fixed line subscriber base stood at 142,122 at the end of December 2016, down from 160,490 a year earlier, 169,236 in December 2014 and 174,165 at end-2013. Although the government has invested heavily in the national telecoms infrastructure since the incumbent was established, many rural regions remain uncovered by BTCL's network.

Owing to the lack of competition in the wireline sector and the lack of effort being put in by other entrants, mainly due to the associated cost of laying the groundwork and the wide spread reach of their corresponding wireless service, there has been a significant drop off in the number of people using wireline devices. This has led to stagnation in the wireline market and there isn't sufficient growth to consider wireline systems as an option in our analysis.



## Network and Location Requirements

The supplier is a medium scale textile company based in Botswana and the kind of network usage may not be high. Their main network requirements are to connect their various offices and manufacturing plants. They would also need a secure connection to interact with DONCOs offices while needing sufficient bandwidth to connect to DONCOs SCM systems.

The basic mode of communication with DONCO would be e-mail for daily business transactions. DONCO might also need basic video conferencing features with the supplier in order to hold meetings with the supply chain teams and executives to discuss textile orders and other matters of business.

Call type	Minimum download/ upload speed	Recommended download / upload
Calling	30kbps / 30kbps	100kbps / 100kbps
Video calling / Screen sharing	128kbps / 128kbps	300kbps / 300kbps
Video calling (high-quality)	400kbps / 400kbps	500kbps / 500kbps
Video calling (HD)	1.2Mbps / 1.2Mbps	1.5Mbps / 1.5Mbps
Group video (3 people)	512kbps / 128kbps	2Mbps / 512kbps
Group video (5 people)	2Mbps / 128kbps	4Mbps / 512kbps
Group video (7+ people)	4Mbps / 128kbps	8Mbps / 512kbps

From the table above we deduce that the supplier might need download to upload speed of at least 2-4 Mbps. As the network needs usually scale exponentially each year it is wise to design the network higher than the requirements. As Group Video conferencing is the most resource consuming application, it is safe to say that other requirements of the supplier would also be covered under these speeds.

DONCO needs the supplier to have sufficient bandwidth and reliable connection to integrate them into their real-time supply chain system. We know that the target breach has the upper management worrying about the security of their systems when they are contracting a supplier in any underdeveloped country. So, additional security and confidentiality of customer information along with complete control over its data is key to DONCO requirements.

As for the suppliers' location, they need to be located in or around a city which is well connected to either modes of export which entails them being close to railways, ports or airports. The cities should also have ISPs which satisfy the basic network requirements based on international standards and can provide a minimum of 10 Mbps speeds based on our estimation.

# Recommendations for feasible Locations and ISPs

## Recommendations for Location:

Based on our research and analysis from the previous parts, we would recommend DONCO to approve suppliers situated in/near the following locations with decreasing levels of preference:

- **Gaborone**
- **Francistown**

These towns have been selected based on the following criteria:

1. **Internet Coverage:** Viewing the heat map we have presented in **figure x** , we can clearly see that the internet coverage for all areas in Botswana is practically nonexistent except for the two cities of Gaborone and Francistown. Therefore, if the suppliers are located near these areas, it is easier for them to get internet service in a relatively cheap and reliable way from the nearby ISPs.
2. **Convenience:** Gaborone and Francistown are both the major cities in Botswana which have decent infrastructure and interconnectivity. They both have access to international airports which could be used to ship the textiles through and fro. These cities also account for most of the population in Botswana, thus we can expect the labour and resources to be cheaper for the suppliers present here. Also, both of these cities are near rivers which could provide cheaper water supplies to our suppliers based on their needs, thereby getting production costs down.

## Recommendations for ISP

### Broadband: Botswana Telecommunications Corporation Ltd (BTCL)

For Broadband, we mainly considered two of the multiple broadband providers present in the country which were BTCL(Botswana Telecommunications Corporation Ltd) and BBi (Botswana Broadband Internet) based on the coverage and packages they provided. To compare, we performed a SWOT analysis for both the providers which is given below.

Strengths	Weaknesses
- It is 51% Government Owned	- Incumbent Service Provider
- Widest Network in Botswana	- Not very competitive
- Cheapest rates	
- Fastest Data Speeds Offered	
- Provide secure VPN service	
Opportunities	Threats
- They can build on their existing Network Infrastructure	- Inability to keep up with the current Network improvements
- Provide wide variety of plans for different needs	- Their major service provided is DSL which is an old technology
- Can work with BoFiNet to provide additional network features	

#### BTCL

Strengths	Weaknesses
- Sattellite Gateway facilities offered	- Satellite technology is expensive
- Operates and maintains its own Backbone Network	- Small Portion of market share captured
- Nominal rates	- Very few variety of plans offered
- Satellite voice & data services	
- Extremely reliable network	
Opportunities	Threats
- Wider range of plans can broaden their market	- Already many huge existing players in the market
- High scope for growth	

#### BBi

From the given SWOT analysis, we would recommend BTCL to the supplier as it is very well connected across the country and mainly Gaborone and Francistown. They also provides on of the highest speeds of any of the broadband networks. They provide upto 20 Mbps and a very nominal rate of BWP1,763 (\$170) with an additional setup fee of about BWP250 (\$24). These are some of the cheapest rates possible.

They also provide VPN capability which serves as a huge advantage compared to other Broadband service providers. They provide affordable, limitless, secure and multi-tasking broadband network, which makes them the best in the region despite the few weaknesses that they may have.

## Wireless Technology: Mascom Wireless

Similarly, when it comes to our mobile service provider, we mainly considered two service providers, namely, Mascom wireless and Orange Botswana because they are the only service providers which provide 4G coverage in Botswana, while BTCL only provides upto 3G speeds.

To decide between these two, we perform a SWOT analysis for each provider which is given

Strengths	Weaknesses	Strengths	Weaknesses
- Largest Wireless Mobile operator	- Potential to improve on speeds	- Second largest Mobile operator	- Lower coverage as compared to Mascom
- Market Leaders in 3G and LTE		- Slightly cheaper plans than Mascom	- Most of the market share is taken by Mascom
- Most Technologically advanced network. First to Roll out 3G & LTE		- Large number of plans offered	- Less reliable speeds
- Various plans offered for Businesses		Opportunities	Threats
Opportunities	Threats	- Can leverage its position in broadband sector when offering bundles	- Multiple cyber threats risk in Botswana
- Potential to enter other markets like Broadband	- Potential to become a monopoly in wireless sector		- Stiff competition from Mascom
	- Cyber-Security threats		

below:

### Mascom

### Orange

Based on the SWOT Analysis for each provider, we observe that the coverage offered by Mascom is way better than Orange and since connectivity is of paramount importance to DONCO, we opt to go with Mascom Wireless as our mobile service Provider. They also have many business bundles which offer connectivity and calling for small to medium businesses at moderate rates (approximately \$40 per device per month).

# Security

## **Security risk assessment for Botswana:**

Botswana does not have any officially recognized national (and sector specific) cybersecurity frameworks for implementing internationally recognized cybersecurity standards for the certification and accreditation of national agencies and public sector professionals.

With the absence of consumer protection agencies and a government regulatory authority to enforce cyber risk compliance, there is little incentive for companies to adopt a more proactive stance regarding IT security. The result is that security is not considered a priority by many organizations and is limited to standard traditional password and firewall driven security controls.

This has led to Botswana being one of the most-attacked countries all over Africa with experts identifying the following most common types of attacks as among the most serious threats to businesses:

- Malware and Ransomware
- Financial fraud (mainly through phishing)
- DDoS
- Espionage

To address these security issues, we have come up with a multifold security system which encompasses our main suggestions to implement a comprehensive cyber security system for our

suppliers. This system takes into consideration increasing security at physical, personnel and organizational levels as follows:

- **Physical Security:** This emphasizes on the importance of protection of all physical assets like desktop machines, laptops, storage devices, etc. for both DONCO and its suppliers as they are vital for the day to day functioning of the company. There should be a high focus on allowing the laptops only for business use with constrictions as to personal use to retain data integrity. All of these machines should be equipped with the latest anti-virus softwares, firewalls and tools to prevent cyber-attacks. As ransomware and malware are some of the most common ways of cyber-attacks, tools like CryptoStopper, which can stop most ransomware from doing any damage for as little as \$1 per month should be utilized on all machines. Also, There should be regular backups of data on a daily and weekly basis to remote servers (preferably Cloud servers) which would aid greatly in data recovery and availability in case of any data theft or loss.
- **Personnel Security:** This is one of the most important security constraints that we need to implement in a country like Botswana. One of the biggest reasons for Botswana being one of the most cyber attacked countries is the lack of awareness about the importance of cyber security. We would advise DONCO to enforce their suppliers to have regular workshops highlighting the magnitude of cyber-attacks and the essentials of not sharing passwords or opening Emails from unknown sources and other trivialities which don't get enough consideration. We would also recommend DONCO to restrict access to their systems when the employees are offsite. In terms of personnel security, all DONCO employees and suppliers should have separate access codes which makes it easier to identify sources of data breach and isolating it. The laptops should also be encrypted using PGP encryption which drastically decreases attacks like ransomware and DDoS.

DONCO should definitely create its own VPN which would be beneficial to its employees while giving its suppliers a way to communicate with DONCO in a safer and less intrusive manner.

- **Organizational Security:** Security at an organizational level is essential for a company like DONCO as it plans on having its suppliers all over the world as a security breach at any of its suppliers side can put the entire organisation at a risk. Thus, DONCOs IT department can keep constant track of all the interactions from its suppliers to any organisation other than DONCO to ensure complete data privacy.’

All of these security measures should just be a part of a bigger security process. DONCO should establish the need of a security framework (like NIST) being set in place by each one of its suppliers to completely secure itself from any cyber security attack. Especially in a country like Botswana which has one of the highest rates of cyber-attacks in Africa.

Also, we need to realize that while these preventative measures may work for the time being, the cyber attackers are constantly innovating and DONCO needs to keep investing time and energy to constantly upgrade its security profile for itself and all of its suppliers.