ALBANY

WORLD BANK GROUP

Strategy and PPP Options for Supporting the ICT Sector and Broadband Connectivity in Somalia

January 2017

WORLD BANK GROUP

Strategy and PPP Options for Supporting the ICT Sector and Broadband Connectivity in Somalia (P154836)

FINAL REPORT

Contents

List of Figures

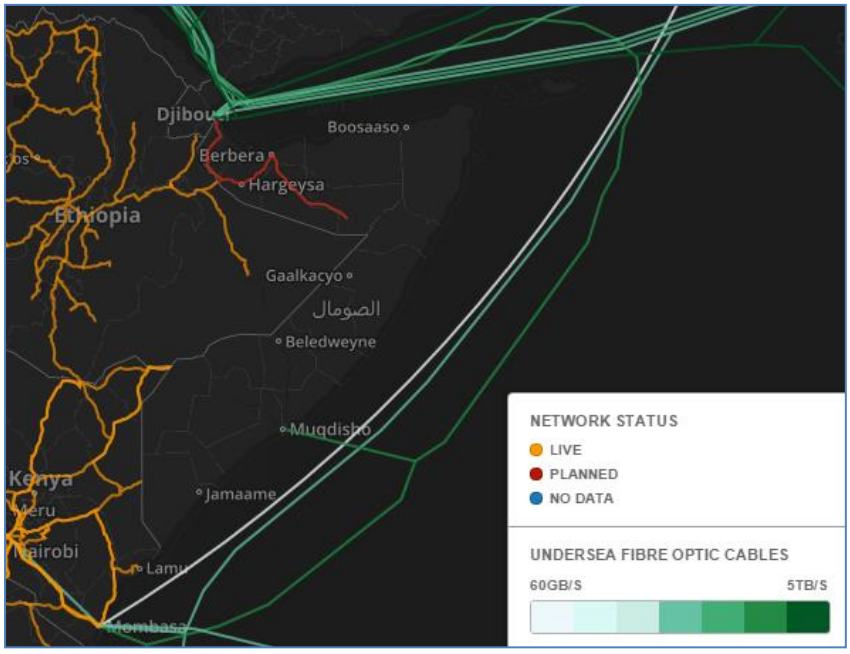
1 Executive summary

Somalia's mobile telephony market is relatively well developed with a penetration rate of about 60%, but in stark contrast, **the Internet sector remains underdeveloped with less than 3% of the population having broadband access, one of the lowest rates in the world.**

Inadequate broadband infrastructure is the key reason for this poor performance of Somalia's Internet sector. Until early 2014, international connectivity was provided almost entirely by satellite using very small aperture terminals (VSATs), which have limited capacity, particularly when used for data traffic. This has led to an undersupply of international bandwidth and slow, unreliable Internet connections at high prices as a result.

While international connectivity has improved in recent years with the landing of the EASSY submarine fibre optic cable in Mogadishu and terrestrial cables at the borders with Djibouti and Kenya, Somalia almost completely lacks a national fibre optic backbone network to distribute the international bandwidth within the country. The map below clearly illustrates how most of Somalia stands out in this regard as a 'dark spot' in comparison with its neighbouring countries.

Fig. 1: International fibre optic cables around Somalia and terrestrial backbone infrastructure



(Source: afterfibre.nsrc.org)

The lack of a national fibre optic backbone network is now the key inhibitor to the development of Somalia's broadband market. In addition, such a network would enable Somalia to establish itself as a supplier of international bandwidth to landlocked Ethiopia, a highly lucrative market with a population almost ten times the size of Somalia's own.

Given the enormous economic and social benefits that broadband Internet access can deliver, the expansion of broadband access to a wider part of the population has to be a key strategic objective for the government of Somalia and the private sector alike. However, neither the public nor the private sector can or should do this alone. The public sector lacks the capacity and experience necessary to build and operate telecom infrastructure, but it can contribute donor funding that the private sector does not have access to, provide subsidies in hard-to-reach areas, and create a regulatory environment that legitimises and protects private assets in national infrastructure. Due to this

common interest, **a public-private partnership (PPP) and joint investment programs are models worth considering for the development of a national backbone network.**

The ICT Sector Unit of the World Bank Group is working with the Ministry of Posts and Telecommunications (MPT) and the Ministry of Finance (MoF) to provide a program of ICT Sector Support 2014-2018, which includes a significant ICT connectivity component. To enhance the country's domestic and international connectivity, technical assistance with preparatory funding from the Public Private Infrastructure Advisory Facility (PPIAF) will support the development of an action plan, including the use of PPPs as well as joint investment programs with other infrastructure projects.

The objectives of the project consist of **four components**:

- Component 1: Developing a medium-term ICT sector connectivity strategy;
- Component 2: Preliminary assessment of the regulatory, commercial and technical issues relating to development of a fibre optic backbone network (the progress of the Communications Act will influence this component);
- Component 3: Capacity-building in the Ministry and Regulator, both through national and international level training;
- Component 4: Preparation of PPP options and recommendations.

Within the context of Components 1 and 2, the current and future bandwidth demand in Somalia has been estimated at up to 5 terabits per second (Tbps) by 2035, including international and domestic bandwidth as well as transit bandwidth to Ethiopia. A concept design has been developed for a national fibre optic backbone network connecting the country's ten largest cities and most prominent universities, taking into account the currently ongoing development of additional international connections such as the G2A and DARE submarine cables as well as challenges such as the lack of security and basic infrastructure in parts of the country and the generally poor condition of the road network. On the other hand, cost saving potentials from combining the network deployment with necessary road reconstruction have been identified.

The envisaged domestic backbone network would cost between US$67 million and 100 million to build. Reaching additional smaller cities and rural areas and improving network resilience in subsequent phases would require additional investment.

In order to attract this level of investment and to encourage participation of the private sector, **Somalia's fledgling regulatory environment needs to be strengthened** and harmonised across the different economic zones of the country so that investors – both domestic and international – gain confidence that their investments will be protected. The report therefore looks at changes in the regulatory environment that would be necessary to create this regulatory certainty. Key recommendations relevant to the national fibre optic backbone include a distinction between wholesale and retail services in the licensing framework and a review of monopoly licences issued by previous governments.

Successful collaboration between government and the private sector under a PPP and effective regulation of the sector will require **capacity building**. An initial resources and skills assessment carried out within the context of Component 3 of this project (Capacity-building in the Ministry and Regulator) has found that virtually no formal staff training has ever taken place within the relevant government departments due to a lack of funding. The federal Ministry realises it lacks key staff with the skillsets necessary for the effective delivery of core technical functions. The regulator has not yet been established, but it is likely that in the start-up phase key Ministry staff would be seconded to it. Therefore, based on the resources and skills assessment, a training plan for key staff from the Federal

and State Ministries has been outlined as part of this project, focussing on technical, commercial and regulatory issues related to the national fibre optic backbone. In addition, options for **outsourcing certain PPP activities or regulatory functions** have been examined.

The final section to this report sets out a list of recommendations, largely focused on the consultative process that will be required. As the report emphasises the need for stakeholder participation, transparency and proper understanding of the risks (legal, political and otherwise) of the Somali environment, these recommendations aim to outline, in a relatively simple and straightforward way, concrete steps that the government can take in concert with donors and other stakeholders in order to make this PPP project a reality. Each of the steps would necessarily involve face-to-face meetings and workshops and should be tied to a clear and detailed schedule of milestones. Each of these recommendations summarised here are expanded upon in the last section of this document and draw upon more detailed explanations in this report. Specifically, stakeholders should take the following initial steps:

1. Make clear that the PPP should be led by the private sector.

2. Convene potential stakeholders to determine likely levels of financial support.

3. Determine likelihood of involvement of multilateral organizations (such as the World Bank), as expertise and resources from such organizations will be required.

4. Put expertise in place to drive the process.

5. Identify where in the government PPP expertise should be placed.

6. Develop a business and financial plan.

7. Conduct a review of the Somali legal landscape to determine what relevant legislation exists or is missing.

8. Establish any key legislative goals and priorities for the PPP agreement among the parties.

9. Put any necessary laws and rules into place.

10. Establish the investment structure and PPP agreement.

2 Component 1: Developing a medium-term ICT sector connectivity strategy

2.1 Strategic objectives for the sector

- Increase broadband penetration
- Strengthen and harmonise regulatory framework to encourage investment
- Capacity building

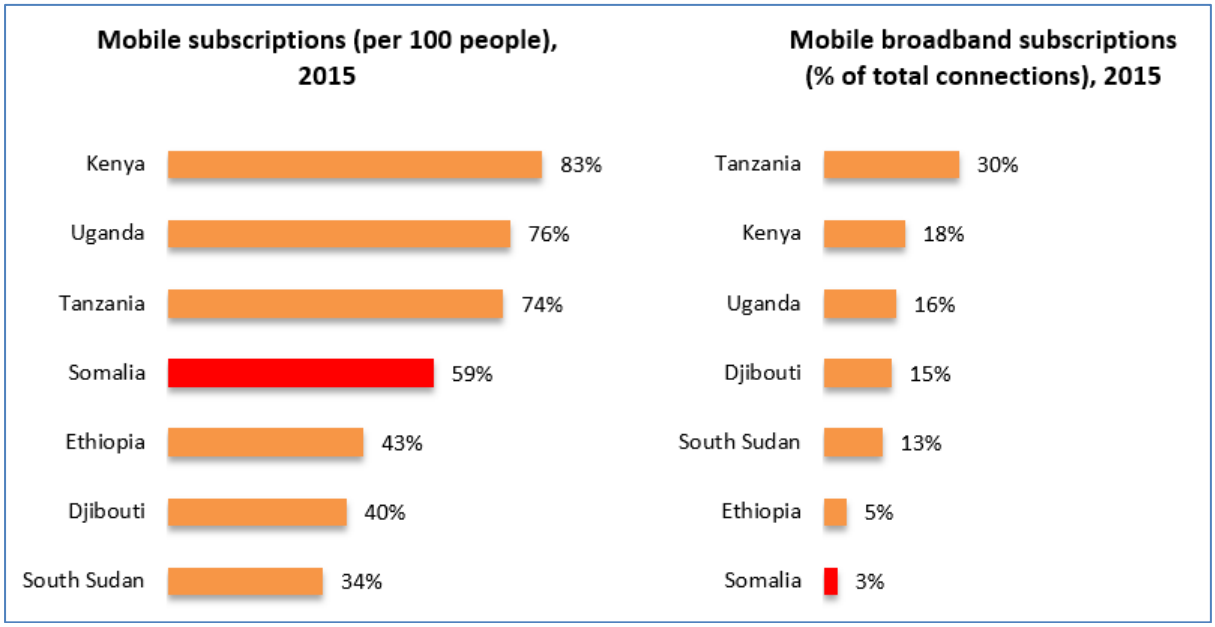
The telecommunications sector in Somalia has operated in a largely unregulated environment since the fall of the Siad Barre regime in 1991. In the absence of a central government during the following two decades, the country descended into chaos and clan warfare, domestic institutions broke down as well as international relations. Private entities and individuals seized what was left of former government assets and used them for business and other purposes. Even after the formation of a transitional government in 2012 and subsequent governments, institutions remained weak and government revenue minimal in the absence of regulation and taxation, which has meant that government has been unable to provide properly funded services to its citizens.

The telecom sector is one of the few relative success stories in the Somali economy during this era, fostered by the emergence of GSM in the 1990s as a low-cost wireless/mobile communications technology that rapidly started replacing the underdeveloped fixed-line networks across Africa. It is remarkable how local players without support from a central government and with very limited access to outside funding managed to set up an industry operating in the most difficult conditions of anarchy and warfare and achieving some relatively good performance indicators. According to a World Bank study in early 2016[1], mobile phone market penetration in Somalia was 59% in 2015 with 6.2 million subscriptions (active SIM cards) among a population of around 10.5 million[2], although it was estimated earlier that the average subscriber in Somalia has 1.7 SIM cards, mostly due to a lack of interconnection of the different networks, which leads to a figure of only around 3.6 million individual subscribers.

[1] Michael Minges: 4G Mobile Broadband Scenario for Somalia, February 2016

[2] An UN-supported survey by local authorities estimated that Somalia's population was 12.3 million in 2014.

Fig. 2: Mobile and broadband penetration rates in Somalia and other East African countries, 2015



(Source: Adapted from GSMA Intelligence)

As the above graph shows, Somalia has actually outperformed some of its regional neighbours such as Ethiopia, Djibouti and South Sudan in terms of mobile subscriptions. However, Ethiopia and Djibouti have monopoly telecom companies which typically perform poorer than competitive markets, and South Sudan has been in an armed conflict situation since 2013. On the other hand, Somalia has performed significantly poorer than properly regulated competitive markets such as Kenya, Tanzania and Uganda, even though it must be noted that these countries have significantly higher GDPs per capita than Somalia's US$400 (2014 estimate, CIA World Factbook) which translates to higher consumer buying power.

The picture is quite different in terms of broadband market penetration, though. The above graph shows that only 3% of mobile subscriptions in Somalia are used for broadband access, which is the lowest rate of all countries in the region and one of the lowest in the world. The Internet user penetration was 1.76% in Somalia in 2015, according to ITU statistics[3].

There are two main reasons for this poor performance in Somalia's broadband sector:

1. The high cost of international bandwidth, due to the relatively late arrival of fibre optic connectivity in Somalia, the current monopoly positions of Dalkom and Somcable with their landing stations and a lack of monopoly regulation.

2. Apart from Somaliland, there is no domestic fibre optic backbone network that would take the international bandwidth from the landing stations to other cities and towns across the country. The utilisation of the backbone network in Somaliland is poor due to the controversy regarding Somcable's monopoly licence.

Due to the piracy problem in Somali waters and other reasons, international fibre optic connectivity reached Somalia relatively late, in 2014 when Dalkom landed the EASSY cable in Mogadishu and Somcable launched services on a terrestrial fibre link from Djibouti into Somaliland. Around the same time, NOFBI's and Liquid Telecom's terrestrial fibre links from Kenya reached the Somali border. This

[3] ITU World Telecommunication/ICT Indicators Database, 20th edition, June 2016

relatively late arrival of international fibre has meant that wholesale prices of bandwidth have only recently started to come down. Cost savings have not yet been fully passed on to the retail level because many operators may still be sitting on long-term satellite contracts at higher cost or they are not yet able to connect to the fibre in many locations. Golis Telecom for example still obtains about two thirds of its international bandwidth from various satellite providers.

More significantly, the Dalkom and Somcable landing stations are currently the only ones providing wholesale bandwidth in their respective regional markets, creating monopoly situations. In addition, both companies are also either directly operating as retail service providers or are closely affiliated with one, which invites the risk of anti-competitive pricing.

The resulting relatively high cost of broadband services at the retail level has hindered a more rapid increase of market penetration, even in locations that are close to the international landing stations. However, with three entry points into the country, Somalia's international connectivity now stands on a good basis to support future development of the broadband market, and the situation is going to improve further significantly with additional initiatives underway such as the G2A and DARE subsea cables.

73%

THE SHARE OF THE SOMALI BROADBAND MARKET IN TERMS OF POPULATION THAT IS CURRENTLY NOT ADDRESSABLE DUE TO THE LACK OF A NATIONAL FIBRE OPTIC BACKBONE NETWORK.

The more significant obstacle to growth in Somalia's broadband market is now the lack of a domestic fibre optic backbone network, which means that large parts of the access networks across the country still rely entirely on microwave and satellite connectivity, including many major cities and towns. Only the residents of Mogadishu and in Somaliland those in Hargeisa, Berbera and some other smaller towns are currently within reach of broadband Internet connectivity through fibre optic backbone networks (although most of them are unable to afford it at this stage) – an estimated combined total of between 2.8 million and 3.6 million people or between 27% and 34% of the country's 10.5 million total population.

For telecom operators this means a huge loss of commercial opportunity: between two thirds and three quarters of their potential market for broadband services is currently not addressable due to the lack of a fibre optic backbone network. For the country as a whole it means that up to three quarters of the population are out of reach of the economic empowerment that broadband Internet access can bring through information, education, communication and e-government services.

Given the enormous economic and social benefits that broadband Internet access can deliver, the expansion of broadband access to a wider part of the population should be a key strategic objective for the government of Somalia and the private sector alike. However, neither the public nor the private sector can or should do this alone. The public sector lacks the capacity and experience necessary to build and operate telecom infrastructure, but it can contribute donor funding that the private sector does not have access to, it can provide subsidies for infrastructure deployment in hard-to-reach areas, and create a regulatory environment that legitimises private assets in national infrastructure so that investors – both domestic and international – gain confidence that their investments will be protected by law. Due to this common interest, a public-private partnership (PPP) and joint investment programs are models worth considering for the development of a national backbone network.

Because a national backbone network is by definition an infrastructure that crosses state and other administrative borders within a country, the regulatory environment also needs to be harmonised

across states in Somalia, including Somaliland, Puntland and the emerging federal states in the rest of the country.

As an overarching aim, capacity building and training must be made a strategic objective for the ICT sector. Two decades of conflict have led to mass emigration and deficits in the education sector, which has caused severe skill shortages affecting both the public and private sectors, resulting in relatively poor network and service quality and inefficient regulation.

2.2 Current and future bandwidth demand in Somalia

In order to design the national backbone network for adequate capacity, the demand for bandwidth needs to be estimated and projected into the future. This task is particularly difficult in Somalia because there is very little reliable data available that could be used in a forecasting model. Basic demographic data such as population size and distribution, average income etc. is either not available at all or varies greatly between different sources. Specific supply-side ICT market data is scarce because

a) the country's broadband market is in its infancy, and
b) the telecom operators are reluctant to provide information, fearing regulation and taxation that could be imposed on them; figures provided may be under- or overstated.

Due to this lack of reliable baseline data, an extrapolative approach was chosen for estimating bandwidth demand in Somalia and designing the backbone network for adequate capacity, based on benchmarking against other countries in the region which have recently gone through similar developments of their broadband markets.

2.2.1 International bandwidth

International bandwidth is the bandwidth available at an international landing station (ILS), be it a subsea fibre optic cable ILS, a terrestrial cable border crossing or a satellite earth station. The total international bandwidth of a country is the sum of all international bandwidth at all ILS in the country.

Telecom operators normally report their international bandwidth, along with other operational data, to a regulatory authority which aggregates the data and reports it to the International Telecommunications Union (ITU) which then produces statistics for all member countries. In the case of Somalia this process is not functioning properly because a regulatory authority has not yet been established and ITU membership fees have not been paid consistently. The ITU statistics show only 100 Mbps of international Internet bandwidth for Somalia in 2014, up from 50 Mbps in 2012 (before the EASSY cable landed in Mogadishu and the Somcable network launched in Somaliland), so these statistics appear to be incomplete – in other countries a much greater increase of international bandwidth has been observed when international fibre optic cables landed for the first time.

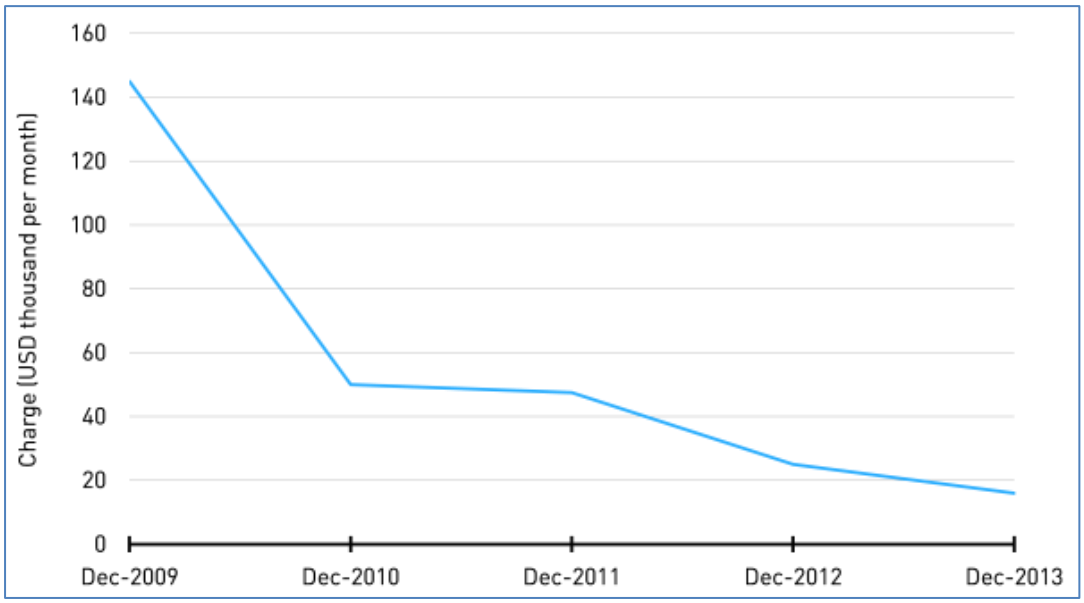
A survey among Somali telecom operators and ISPs as part of this project in early 2016 has revealed that, combined, they are already using around 23 Gbps of international bandwidth. About 45% of this amount currently relies on an estimate because not all operator interviews had been concluded at the time of writing this report. Only a small part of this bandwidth is likely to be used for conventional international voice traffic (less than 100 Mbps, based on estimates of international voice calls flowing in and out of Somalia as part of a World Bank study in 2014/15[4]), so almost all the international

[4] Peter Lange: Telecommunications Contribution to Public Finance in Somalia, January 2015

bandwidth of around 23 Gbps would be data/Internet bandwidth. This equates to approximately 1.9 kbps of international bandwidth per person in Somalia's population of about 12.3 million.

Neighbouring Kenya reached this level of 1.9 kbps/pop at a very similar point in the development of its broadband market, about two years after its first international fibre optic cables landed in the country in 2009. It appears that the more limited buying power of Somali consumers (reflected in the country's lower GDP per capita of US$400 compared to Kenya's US$3,300[5]) has been compensated in the five years since then by the decline of the cost of international bandwidth in the region. Similar declines have been observed elsewhere on the continent, as the following graph illustrates.

Fig. 3: Cost of STM-1 circuit between Johannesburg and London, 2009 - 2013



(Source: Telegeography, 2014)

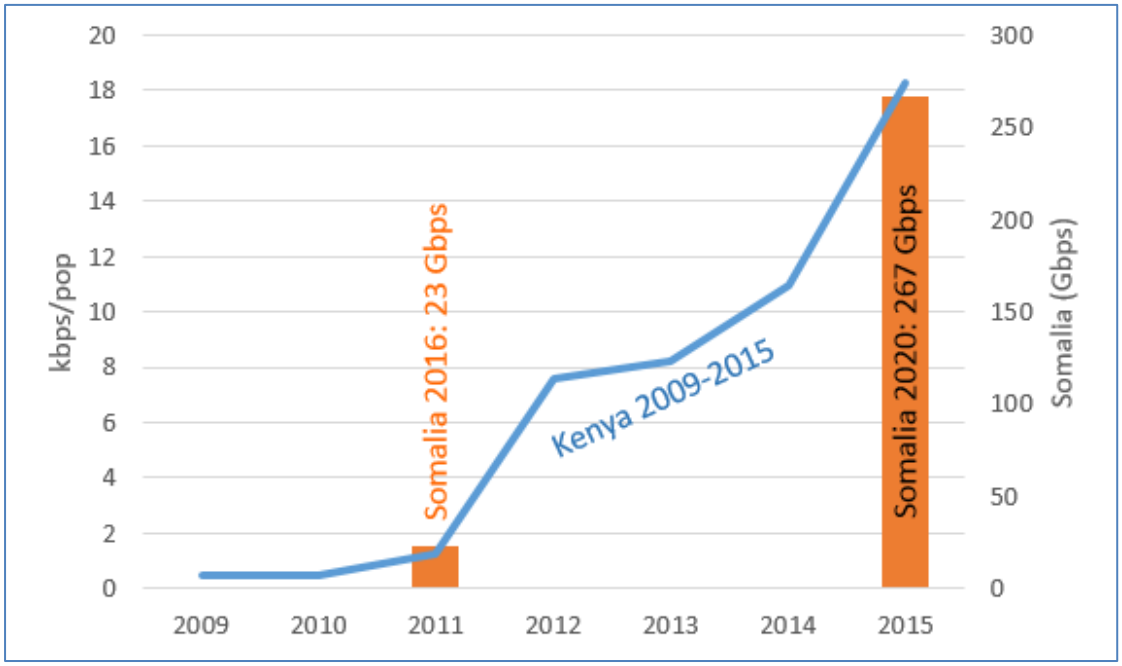
It therefore seems plausible to use the example of Kenya as a guideline to extrapolate Somalia's international bandwidth demand in the short to medium term.

At the end of 2015, six years after the landing of its first international fibre optic cables, Kenya was using 854 Gbps of international bandwidth (a 45-fold increase since the end of 2009[6]) which equates to 18 kbps per person in its population of 46 million. Projected on an estimated population of 14.6 million in Somalia in 2020, six years after the landing of its first international fibre optic cables, this means that Somalia would require 267 Gbps of international bandwidth in 2020.

[5] CIA World Factbook

[6] Communications Authority of Kenya, Statistics Reports Dec. 2009 and Dec. 2015

Fig. 4: International bandwidth demand in Somalia 2016, 2020 modelled on Kenya



(Source: Adapted from Communications Authority of Kenya and ITU data)

However, it is expected that Somalia's bandwidth growth curve will start out flatter than Kenya's and then see its strongest growth once the national backbone network starts connecting more cities and metropolitan fibre networks connect more homes and businesses to high-bandwidth services. The difference in Kenya has been that the country already had a national backbone network and metropolitan fibre networks before the international subsea cables landed and several triple play services already existed. But these developments are now also underway in Somalia: fibre rings already exist in several cities, and Somcable has launched triple play FttX services in Somaliland in 2016 (see chapter 3.5).

For a longer-term forecast of Somalia's international bandwidth demand (to 2035) in combination with transit bandwidth for Ethiopia, see chapter 2.2.2.

2.2.2 Transit bandwidth to Ethiopia

In addition to its own international bandwidth demand, Somalia has the opportunity to supply neighbouring countries with connectivity, especially Ethiopia, which is landlocked and thus depends on neighbouring countries for access to international subsea cables. Ethiopia is currently buying most of its international bandwidth from Djibouti and Kenya, which are connected to a multitude of subsea cables. With its population of 95 million, the second largest in Africa after Nigeria and projected to grow to over 150 million within the next 20 years, Ethiopia represents a very attractive market. It had 14 Gbps of international Internet bandwidth in 2014 according to ITU statistics, which equates to only 145 bps/pop, so the market is actually much less developed than Somalia's with its 1.9 kbps/pop (2016). This is mostly due to the fact that Ethiopia is a monopoly market with no competition in any segment of the telecommunications sector.

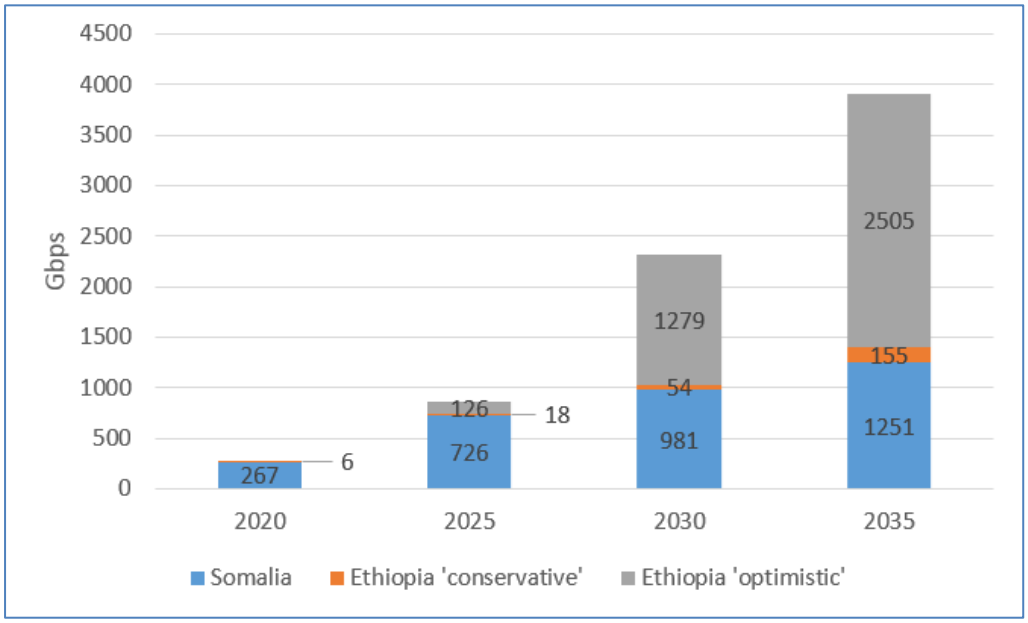
Somcable has already extended its fibre optic network in Somaliland to the Ethiopian border at Wajale and is in negotiations regarding the supply of international bandwidth to the neighbouring country once subsea cables such as G2A or DARE have landed in Somaliland. Yet currently the situation is

reversed: Somaliland, the country with access to the sea, is getting some of its international bandwidth from landlocked Ethiopia.

It is not likely that Ethiopia will open up its telecommunications market before 2020, so the growth of its international bandwidth demand is expected to remain sluggish (the 'conservative' scenario in the chart below). Assuming that by 2020 Somalia would be able to provide 15% of Ethiopia's international bandwidth, this would be estimated to add 6 Gbps to Somalia's own demand of 267 Gbps, resulting in a combined demand of 273 Gbps.

From 2020 onwards, the average annual growth in Somalia's international bandwidth demand is expected to be more in line with recent growth rates in West African countries such as Cote d'Ivoire and Senegal, which have already been connected to international subsea fibre optic cables for longer (around 30% per year) and then flatten out into the single digits as can be observed in South Africa today, Africa's most mature market. In Ethiopia, market liberalisation could occur during this period which would lead to significantly stronger growth there for a number of years (the 'optimistic' scenario in the chart below, although the timing for this is impossible to predict). In the long term, Somalia may be able to supply around a third of Ethiopia's international bandwidth (shared equally with supply from Djibouti and Kenya for the other two thirds), the transit bandwidth sold to Ethiopia would then by far outweigh Somalia's own international bandwidth demand.

Fig. 5: International bandwidth forecast Somalia incl. Ethiopia transit bandwidth, 2020 - 2035



It is estimated that Somalia itself will have an international bandwidth demand of 267 Gbps by 2020 and an opportunity to sell 6 Gbps of transit bandwidth to Ethiopia. By 2035 Somalia's international bandwidth demand is estimated to rise to 1,251 Gbps, the transit bandwidth sold to Ethiopia could increase to 155 Gbps in a conservative scenario. An optimistic scenario for Ethiopia would lead to additional demand in the neighbouring country and a total of 155+2,505 = 2,660 Gbps of transit bandwidth sold. The combined total international bandwidth demand at Somali landing stations would then be 1,251+2,660 = 3,911 Gbps or 3.911 Tbps.

2.2.3 Domestic bandwidth

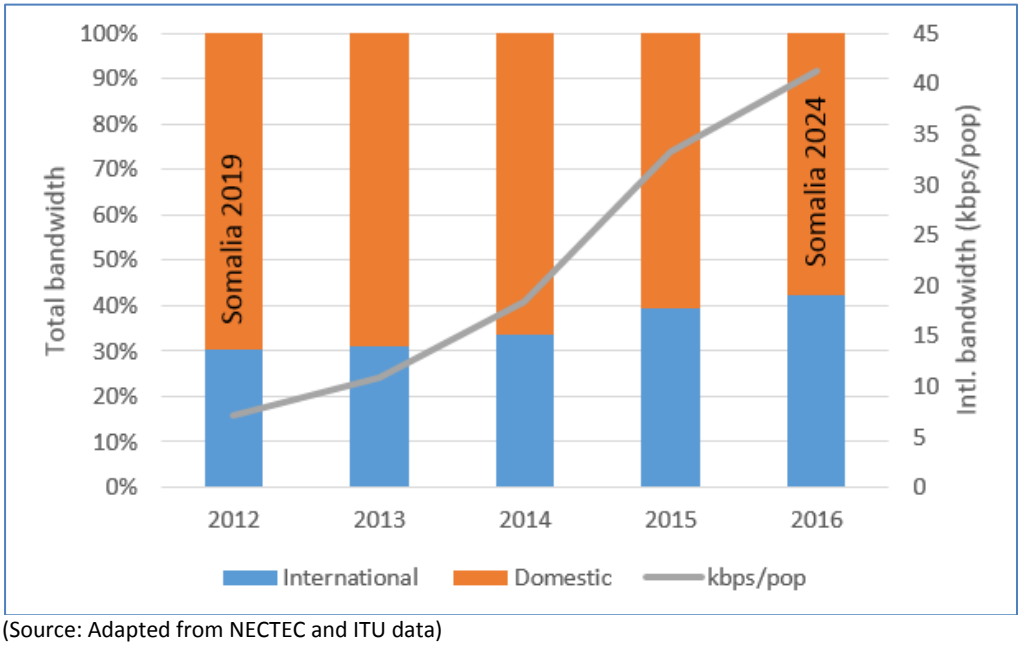
In addition to distributing the international bandwidth throughout the country, the national backbone network will also have to carry domestic bandwidth, i.e. data that originates and terminates in the country without passing through an international gateway. This may include:

- Local Internet content and data exchanged directly by local ISPs through domestic Internet Exchange Points (IXP)
- Domestic Virtual Private Network (VPN) traffic
- Locally hosted cloud services and data centres
- Local digital media and broadcasting content
- International content that has been cached in Somalia to be distributed locally

The data volume in some of the above categories can be significant, although at present many of these sectors are not yet very developed in Somalia. For example, institutions such as banks, research and higher education institutes, government and parts of the private sector may exchange large amounts of data between branch offices within the country through locally hosted VPNs. Broadcasting content, especially high-definition TV requires vast amounts of bandwidth when it is streamed to customers or transmitted from production to playout centres etc. Even greater amounts of data are ultimately predicted to come from machine-to-machine (M2M) communication in the emerging Internet of Things (IoT).

There is no IXP in Somalia at this stage, the .so domain is hosted abroad, and the banking, research, government and digital media sectors are in their infancy, so the amount of domestic bandwidth used in Somalia is estimated to be very low at this stage. However, statistics from other countries show that domestic bandwidth can make up around 60-70% of all bandwidth consumed at a stage of development that Somalia's broadband market is also expected to reach during the next ten years. The example of Thailand is shown in the graph below.

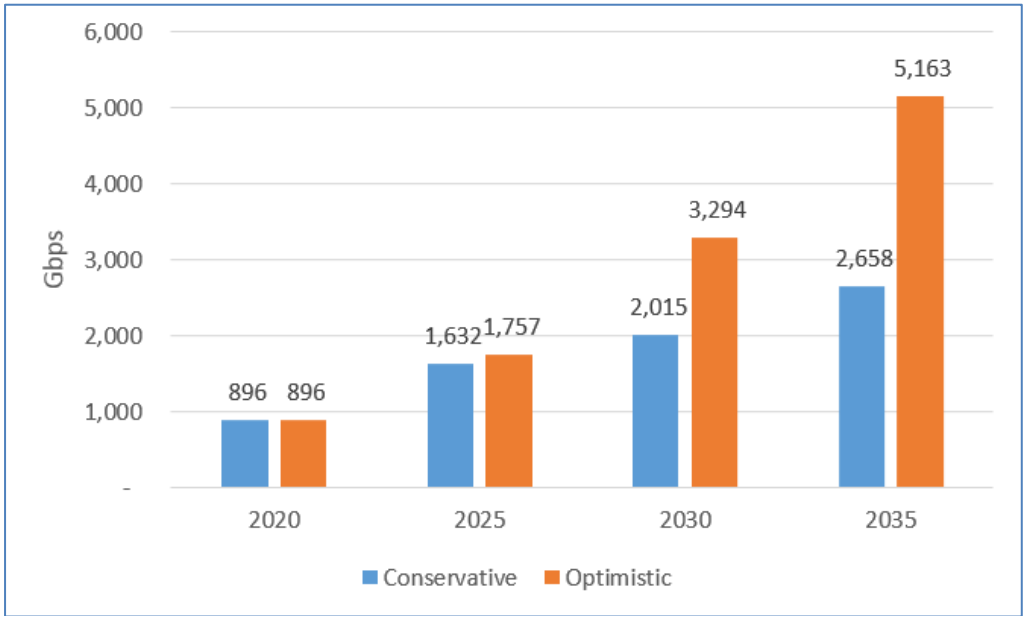
Fig. 6: Domestic vs. international bandwidth demand in Somalia 2019, 2024 modelled on Thailand



(Source: Adapted from NECTEC and ITU data)

Projecting this trend on the international bandwidth forecast for Somalia (see chapter 2.2.1) yields the following forecast for the total bandwidth demand in the country including international, transit and domestic bandwidth:

Fig. 7: Total bandwidth (international, transit, domestic) demand forecast for Somalia 2020 - 2035



2.3 Regulatory environment and necessary reforms

2.3.1 Gaps in Somali legal and regulatory framework

A properly functioning legal framework for large public infrastructure projects generally should include legislation that does the following:

- Identifies and ensures private sector rights, including rights of access to infrastructure and how private sector investments will be protected
- Lender rights and protections
- Rules and procedures for resolution of contract dispute, including enforcement of sanctions and awards of damages
- Rules for movement of capital, foreign investment and expatriate personnel
- Rules for procurement, project management and evaluation
- Rules for obtaining necessary approvals and licenses

Such principles may be included in one comprehensive piece of PPP legislation (also known as concession laws), or may be scattered across several separate pieces of legislation including dispute resolution law, procurement law, labor law, tax law and other commercial law[7].

Solution for addressing these gaps in the legal and regulatory framework are discussed in Section 3.

[7]http://www.keepeek.com/Digital-Asset-Management/oecd/commonwealth/governance/public-private-partnerships-policy-and-practice_9781848590694-en#page1

2.3.2 Federal Government of Somalia: The draft National Communications Act

One piece of legislation relevant to a PPP broadband project that has been developed significantly is the framework for establishing an independent communications regulator and a communications licensing regime. Draft legislation establishing this framework, known as the National Communications Act of 2014 (the "Bill"), was presented to the Parliament of the Federal Government of Somalia (FGS) in May 2014. Since then, the Bill has gone through two of the three readings required for passage. Although it is understood that changes have been made to the May 2014 draft as a consequence, references in this report relate to an English translation of that draft that was conducted by the World Bank in May 2015.

The Bill proposes to establish a regulatory authority to be called the National Communications Commission (NCC) to oversee the telecommunications and broadcasting sectors and manage the use of the radio frequency spectrum.

This Bill has been in existence since 2012, and has undergone significant consultation with the industry and other stakeholders. The Bill is still under consideration by the parliament, and another Albany project contracted by the World Bank is advocating for its passage (Phase 1 of the WBG ICT sector support program in the Federal Republic of Somalia – "Establishing an ICT regulatory agency and IT licensing framework"). It is assumed that the Bill will be adopted and constitute the piece of legislation most relevant to the fibre optic backbone discussed in this report.

As part of that project, Albany and its partner Incyte Consulting drafted a report in May 2015 entitled "Establishment of the National Communications Commission' analysing the Bill and recommending improvements as well as regulatory actions necessary to bring the Bill and its implementation in line with international standards. The key recommendation relevant to the country's ICT fibre optic backbone is that the licensing framework envisaged in the Bill currently applies only to retail operations and should be changed to cover wholesale activities as well, as is discussed further in Section 3.1 below. Other recommendations include suggestions on organizational structure, recruiting and allocation of resources. The report is provided as an annex to this document.

The Bill is intended to apply to the entirety of the area of the FGS. However, there are ongoing disputes and discussions as to how Somaliland and Puntland will be incorporated into a federal structure. This is particularly important with the issue of broadband, given that Somaliland has licensed an operator as discussed below in Section 3.1.

2.3.3 FGS: Relative roles of Ministry and regulator

The Bill sets out the relative roles of the Minister and the regulator, as is summarized in the table below.

Fig. 8: Extracts from the Bill regarding roles of the Ministry and regulator

THE MINISTRY/MINISTER

Article 32: Responsibility of the Minister of Communication

The Bill provides the Minister with the following responsibilities:

1. Making policies and decisions and supervising all matters related to communications in Somalia, with the aim of improving the economy and the social welfare of the population.
2. Bargaining for and implementing all communications agreements entered into the name of Somalia with other free nations and multinational agencies.
3. Representing Somalia in all international conferences and treaties concerning communications.
4. Aiding the Supreme Council in its operations, funds, staffs, equipment, training and physical headquarters.

THE MINISTRY

Article 4: Obligations of the Ministry

The obligations of the Ministry include:

20. Preparing and launching general policies and plans for the communications of the country once every three years, or as otherwise required.
21. Promoting universal access to modern communications services in the country.
22. Strengthening the role of government in ensuring that the country takes part in the competition in modern communications at the regional and international level.
23. Encouraging national and international education opportunities and skills for communications and information technology professionals.
24. Informing the public about the importance of communication and acquiring information technology skills, so as to improve the economy and develop the society
25. Protecting and encouraging the proper use of the Internet and other communications services.

THE REGULATOR

Article 22: Tasks of the Supreme Council of the National Communication Agency

The Bill requires the Supreme Council of the regulator to do the following:

5. Supervising and regulating licence holders including communications and broadcasting service providers.
6. Ensuring that service providers abide by international law on communication that Somalia has ratified.
7. Organize public consultation on matters relating to the Bill.
8. Issuing licences in accordance with the Bill.
9. Publishing all conditions required in issuing licences as per the Bill.
10. Monitoring compliance with conditions and regulations in this Bill or issued by the regulator.
11. Allocating radio frequencies to licencees in accordance with the national frequency table.
12. Amending, renewing, suspending or withdrawing licences in accordance with the Bill.
13. Addressing disputes between communications service providers, their customers or others on issues regarding interconnection, infrastructure access, quality of services, numbering, noise pollution, security of information and other issues.
14. Responding to and deciding disputes between communications service providers and customers.
15. Putting in place and protecting the numbering system and allocations.
16. Publishing public information on the regulator's website and protecting data and confidential information.
17. Ensuring that service providers maintain codes of conduct and prohibit explicit materials.
18. Ensuring effective competition in the communications sector.
19. Regulating the national telephone and communications markets.

2.3.4 FGS: Independence of the regulator

The national regulator to be established in the Bill purports to be independent, though there are some aspects of its constitution that compromise its ability to act independently of government. The Bill provides for the Minister to nominate candidates for appointment to its highest governing body, known as the Supreme Council. The Cabinet must then consider these candidates for approval. Candidates must have certain qualifications and experience (e.g. finance, law, economics) and the grounds for dismissal are specified and limited (Article 12 and 13). It is implicit (in Article 14(2)) that the candidates will be living in Somalia (which, together with our understanding of the eligible requirements for civil service positions in Somalia, seems to preclude international expertise being brought in at the Supreme Council level—expertise which could be valuable during the challenging initial years of operation).[8]

The Bill also requires (in Article 12) that two of the seven members of the Supreme Council be from the Ministry, three members to be from the business community, and two members to be lawyers. All positions are envisaged to be part time, creating the expectation that the Commission members may be otherwise employed (Art. 7). Although the mandatory involvement of Ministry officials in the Supreme Council may help to bring in relevant policy knowledge and expertise, it compromises the independence of the regulatory organisation, particularly as there is no apparent restriction in the Bill on a Ministry official being appointed to the role of Chairperson or Vice Chairperson. The mandatory inclusion of Ministry officials on the Supreme Council should be reconsidered; at the very least Ministry officials should be excluded from the key leadership roles of Chairperson and Vice Chairperson.

The way in which the NCC is to be funded under the Bill would work to increase its independence. Specifically, the Bill envisages that the NCC will be funded through the retention of 15% of the total licence fee revenue it collects from licensees. As such, the NCC will not be dependent on direct allocations from the national treasury and the political influence that would necessarily result from such an arrangement. However, this formula for funding does not provide for the greatest costs which are anticipated during the establishment of the regulator, when revenues are likely to be low.

2.3.5 Somaliland: Communications Act and Regulator

Somaliland has passed a Communications Act, which is yet to be implemented. It establishes a regulatory body for communications, including broadband, and that body has licensed an operator to establish fibre optic infrastructure as set out below in Section 3.1.1.

2.3.6 Public consultation

The Communications Bill envisages that the Commission will engage in a consultation process before making a regulation or a significant decision. Such consultation, guided and facilitated by the Albany Incyte reports (referenced above) are anticipated to result in the adoption of a number of international best practices. Consultation will also need to take place with the Somaliland government

[8] For example, this has been the experience of the National Information and Communications Technology Authority (NICTA) of Papua New Guinea, which appointed a former head of the Australian regulator, the Australian Communications Authority, to the board of NICTA following its establishment in 2010 and has since been able to draw upon his regulatory expertise, his experience in the management and administration of a regulatory agency.

regarding how its existing regulatory framework will be incorporated into the national regulatory framework.

2.4 Opportunities and risks for mutualisation of ICT infrastructure in Somalia

Infrastructure sharing is an important trend in broadband development in the last decade. Governments in developing countries, especially in sub-Saharan Africa are investing in infrastructure sharing projects. In contrast to traditional infrastructure sharing agreements, a mutualisation model proposes a common facility operated by market participants. Variations of infrastructure sharing arrangements have recently been used to construct undersea fibre optic cables that have led to the integration of African countries into international networks, deployment of mobile access networks and construction of national backbone networks.

Currently, there are multiple fibre optic network deployments in various stages across Mogadishu from a number of companies (Hormuud, SON & Somali Wireless etc). This poses a complex environment in the long-term development and management of the sector. These developments are currently underway while the Telecom Law continues to be in the Federal Parliament.

2.4.1 Opportunities

In some sectors of the Somali economy, notably the remittance industry, investors from different and sometimes competing communities manage to pool resources and found companies so as to ensure cross-regional operation of the business. This business-based collaboration among entrepreneurs indicates the possibility of mutual collaboration among Somali telecom operators to simultaneously deploy different infrastructural projects. Equally important is the role of the public sector in mutualisation of ICT infrastructure development in Somalia. However, the Somali Government is not yet in a position to take a lead on such projects due to limited available resources.

Below are opportunities of mutualisation of ICT infrastructure:

- Reduce costs in network deployments
- Increased collaboration (buy-in from competitors, improved trust, shared visions, etc.)
- Increased technical knowledge base for the country
- Expanded coverage
- Reduced likelihood of duplication
- Market segmentation and multiplicity of providers
- Long-term sustainability
- Leveraging foreign expertise
- Reduce the rural-urban digital divide
- Accelerate broadband take-up
- Improved market
- Model for other sectors in the country

2.4.2 Risks

In this sector, there are a few very large players that may hinder competition and hence dampen opportunities for innovation. This risk is real in the minds of industry observers. Other risks include:

- Security challenges
- Trust Market Domination (Monopolisation) and unequal players
- Lack of legal and regulatory framework (lack of legal enforcement authority; lack of arbitration body; scarce technical expertise in arbitration and sector specific policy-making staff at the Ministry)
- Lack of trust among key sector players: Absence of a regulator led to the failure of the voluntary interconnectivity agreement among operators
- Lack of expertise of public institutions (both local and federal level)
- Political instability (unclear jurisdiction over governing authority and overlapping; unclear parameters of legal authority; Federal Member States boundary disputes; lack of harmonised governance structures among layers of diverse regional authorities; uncertain jurisdiction not agreed formula)
- Spectrum management issues remain a major challenge for the sector as a whole and more specifically for the ISPs. Signal interference is a challenging reality within Mogadishu, which is the largest market with multiple ISPs of varying sizes.

2.5 Infrastructure development options, coordination with non-ICT infrastructure

The development of a national fibre optic backbone network must primarily follow the population distribution in the country, but it also depends on the availability of underlying infrastructure such as roads. In the case of Somalia, other factors such as regional security come into play in addition.

2.5.1 Major population centres

As a result of the decades-long conflict in Somalia, demographic data such as population size and distribution is unreliable and varies greatly between different sources. Averaging across the different sources results in a list of ten cities with populations greater than 200,000 and a combined population of between 4.5 and 7 million:

Fig. 9: Population of the ten largest cities in Somalia

City	Population range (different sources)
Mogadishu	2.1 ... 2.6 million
Hargeisa	478 … 760 thousand
Bosaso	74 … 700 thousand
Borama	216 … 650 thousand
Galkayo	545 thousand
Marka	230 … 511 thousand
Berbera	242 … 383 thousand
Kismayo	183 … 366 thousand
Laas Anod	233 thousand
Jamame	185 … 225 thousand
Total	**4.5 … 7 million**

(Source: Various)

A terrestrial fibre optic cable connecting these ten cities would pass through several other significant cities and towns with an estimated combined population of 815,000[9]:

- Burao (190,000)
- Afgoye (125,000)
- Beledweyne (106,000)
- Garowe (91,000)
- Qardho (75,000)
- Jilib (65,000)
- Jawhar (62,000)
- Barawe (52,000)
- Bulobarde (32,000)
- Dusamarreb (17,000)

The total population in major cities and towns along this fibre route would thus be between 5.3 and 7.8 million, which equates to between 50 and 74% of the country's total population of 10.5 million.

The map below shows in green:

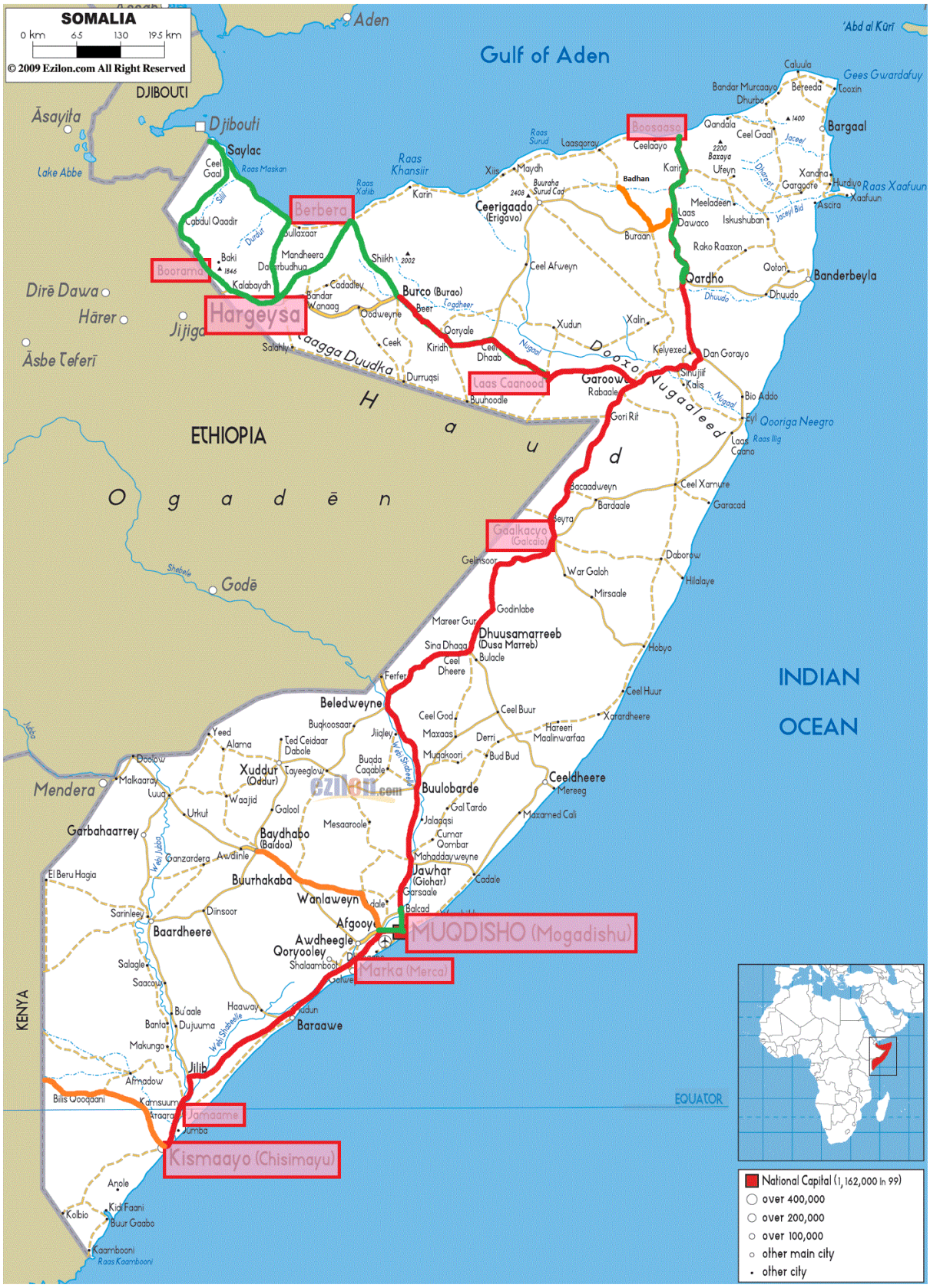
- Somcable's existing terrestrial fibre network which connects Berbera, Hargeisa and Borama to Djibouti and is being extended to Burao and Laas Anod;
- Golis's fibre optic cable between Berbera and Qardho, which is being extended to Garowe, Galkayo, Laas Anod, Erigavo, and Galdogob on the Ethiopian border;
- Hormuud's fibre from Mogadishu to Afgoye and Balcad.

Shown in red is a fibre route that would connect the remainder of Somalia's ten largest cities to the currently existing infrastructure.

Both Hormuud and Dalkom have plans to deploy fibre from Mogadishu to Galkayo. Hormuud has stated that a business plan has been completed. However, security concerns are currently preventing both companies from going ahead with the implementation (see chapter 2.5.5).

[9] Extrapolated from 2000 figures on tageo.com with a population growth rate of 2.9% p.a.

Fig. 10: Fibre optic backbone connecting Somalia's 10 largest cities and most prominent universities



(Map layer source: Ezilon)

2.5.2 Universities

Somalia has over 50 universities and other Higher Education Institutes (HEI), and there is a strong interest in connecting as many of them as possible to high-speed broadband services. The most prominent institutions are listed in the table below:

Fig. 11: Prominent Higher Education Institutes (HEI) in Somalia

City	Prominent HEIs
Mogadishu	Somalia National University, University of Mogadishu, Somali Institute of Management and Administration Development, Benadir University, City University
Hargeisa	Hargesia University, Admas University, Somaliland University of Technology, Gollis University, Hope University,
Bosaso	Bosaso College, Puntland Nursing Institute, East Africa University (Main Campus), Puntland State University (branch)
Galkayo	Puntland State University (branch), Puntland University of Science and Technology, Galkayo University
Berbera	Berbera Marine College, Gollis University, Berbera Maritime & Fisheries Academy
Marka	Marka University
Borama	Amoud University
Kismayo	Kismayo University, Plasma University
Baidoa	University of Southern Somalia
Burao	University of Burao
Badhan	Haji Ayan Community College, Iqra Institute for Higher Education, Maakhir University
Garowe	Puntland State University, East Africa University (branch), Garoowe Teachers Education College

Almost all of the HEIs listed in the table above are in cities that are located along the fibre route proposed in chapter 2.5.1, with the exception of Baidoa and Badhan. These two cities, with estimated populations of 81,000 and 89,000 respectively[10], could be connected to the main backbone by microwave at least for an interim period (see chapter 2.5.6) and included in a second phase of the fibre rollout. However, while Baidoa is located on a main road, Badhan has mostly minor roads leading to it (see Fig. 12), which may mean it will take lower priority.

Possible fibre routes to Baidoa and Badhan are marked orange in the map in Fig. 10. Somcable is in the process of extending its fibre optic network to Erigavo, from where an alternative route to Bahdan could be considered. However, this would mean crossing from Somaliland into Puntland which may not be possible at this stage due to the territorial dispute between the two states. Somcable does currently also not hold a licence for Puntland except for the one it acquired through its merger with Nationlink.

2.5.3 Underlying infrastructure

Long-distance fibre optic cables are usually deployed along linear infrastructure such as roads, railways, power lines, water pipes or other pipelines (e.g. oil pipelines). There are various advantages in using such infrastructure: Common to all types is the fact that physical access is usually easy where

[10] Extrapolated from UNDP Population Estimates 2005 with a population growth rate of 2.9% p.a.

such infrastructure exists, and the right of way is clear so that the cable operator needs to negotiate with only one owner. Often there are existing ducts underground that can be used for laying the fibre, for example alongside existing electrical cables or water pipes.

Aerial power lines offer the option of mounting the fibre optic cable on the existing power poles or masts instead of burying the cable underground. The initial capital expenditure for aerial deployment is about half compared to underground, but ongoing operational expenses for maintenance and repair are higher. Underground cabling is usually preferred in developing countries due to the risk of cable theft: even fibre optic cables, which do not have the value of copper that cable thieves are looking for, are frequently damaged because they are initially mistaken for copper cables. In such an environment, aerial mounting is only considered safe on very tall masts carrying high-voltage power lines which are typically long-distance intercity links.

Somalia lacks most of the linear infrastructure that could serve as a basis for fibre deployment in a national backbone network. There are no railways or suitable long-distance power lines or pipelines in the country. Low-voltage power lines and water distribution networks in some cities could be used for metropolitan fibre deployment, but they are not relevant to the long-distance fibre routes of the national backbone. This leaves the road network as the only underlying infrastructure in Somalia that the national fibre optic backbone network can be coordinated with.

2.5.4 Coordination with road development

Somalia has a road network totalling approximately 22,000 km. According to a joint needs assessment by the United Nations and the World Bank in 2006, only about 10 to 15% of the 2,600 km of primary roads and less than 10% of the 19,200 km of secondary and rural/feeder roads were considered to be in good condition, with the remainder being in poor to very poor condition. Since then, however, several initiatives have been launched to improve the country's road infrastructure.

The fibre route suggested in chapter 2.5.1 to connect Somalia's ten largest cities and Baidoa uses almost the entire network of paved roads in the country, which would make the fibre deployment relatively easy along this route.

Fig. 12: Somalia road network

(Source: logcluster.org)

According to the above mentioned report, almost 80% of the roughly 2,250 km of roads along the route (with the exception of the 500 km segment from Garowe to Berbera via Burao) required resurfacing in 2006, or the road condition was unknown. The Puntland Highway Authority (PHA) began an upgrade and repair project on the Garowe–Bosaso highway in 2012. In 2013 the Federal Government of Somalia (FGS) signed a cooperation agreement with China as part of a five-year national recovery plan, including the reconstruction of the road between Galkayo and Burao. A similar agreement was reached with the government of Qatar in 2014. Puntland launched a project in 2015, funded by the EU and Germany's GIZ, including a renovation of the highway between Galkayo and

Garowe. There is an opportunity to coordinate the laying of fibre optic cable with these various road improvement projects, which should enable some cost savings.

According to the Road Development Agency (RDA) in Hargeisa it costs around US$150,000 per km to build a new road in Somaliland and US$90,000 to seal an existing dirt road. The RDA estimates it would cost around US$15,000 per km to lay fibre, which roughly matches information received from network operators who have deployed fibre in Mogadishu (at a total cost US$ 18,000-20,000 per km, of which approximately 70% is civil works). This means that the additional cost of laying fibre during road work is at most 10% of the cost of building a new road and 17% of the cost of sealing an existing road, but probably less due to synergy effects when both works are carried out simultaneously.

The cost savings due to synergy effects between roadwork and fibre optic cable deployment in Somalia will need to be assessed in detail, but it seems sensible in any case to establish a policy of making fibre optic cable deployment an integral part of any reconstruction of at least major roads in the country.

Different options would then exist for the ownership, management and operation of this infrastructure:

1. If entirely funded by government as part of public road construction, government would initially own the fibre optic infrastructure and have the option of either selling it to a private telecom firm or operating the infrastructure itself, possibly through a management contract with a telecom operator.

2. Under a PPP, the private telecom sector could directly absorb the cost of fibre optic cable deployment alongside public road development, taking advantage of cost savings due to synergy effects during construction, and operate the infrastructure in accordance with agreed principles such as open access.

It is recommended to establish a committee that will coordinate planned road reconstruction with the planning and deployment of the national fibre optic backbone network across state boundaries, staffed by the Telecommunications and Transport Ministries and their associated implementation agencies such as the RDA in Somaliland and the PHA in Puntland. South-Central Somalia does not yet have a comparable agency.

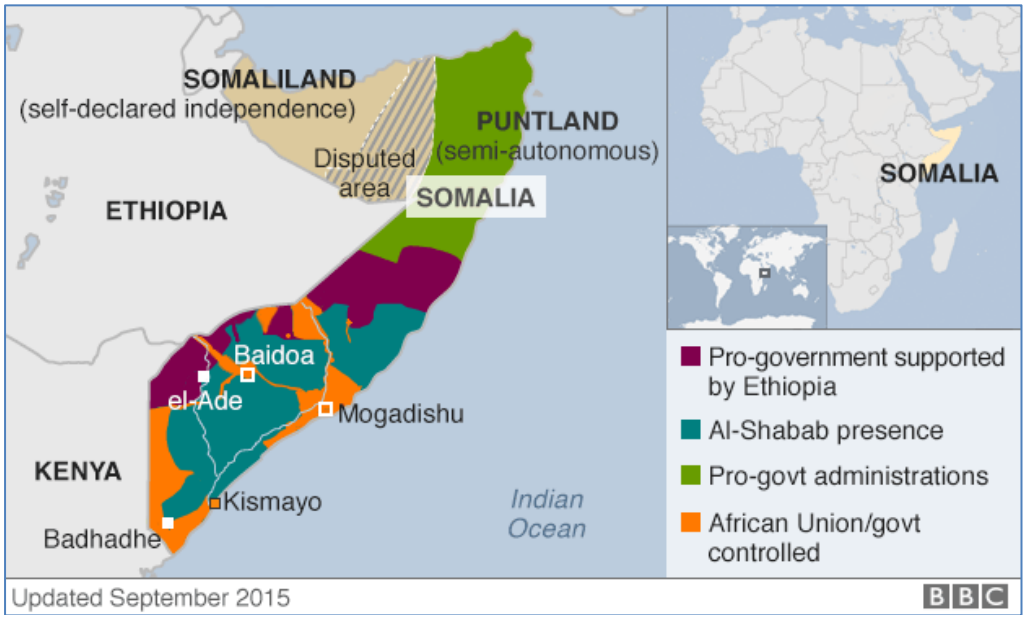
2.5.5 Security

Security is a key factor in Somalia when it comes to building, operating and maintaining a terrestrial fibre optic cable infrastructure. In some parts of the country, the fragile security situation may not yet be sufficiently stable to ensure the safety of construction workers and maintenance staff and to protect the completed infrastructure from damage or destruction. Certain parts of the national backbone network may therefore have to be implemented using non-terrestrial options (see chapter 2.5.6) at least for an interim period.

The areas of biggest concern are those parts of the country where the Al-Shabaab group has a presence, and disputed territories such as the border region between Somaliland and Puntland. As shown in the BBC maps below, areas with an Al-Shabaab presence are concentrated in the south of the country, but more recently the group has intensified its efforts in Puntland as well. However, even in the south, most of the roads that are relevant to the backbone network described in chapter 2.5.1 appear to be under government control, even though certain sections of road are passing through Al-Shabaab territory, e.g. between Mogadishu and Beledweyne and between Mogadishu and Baidoa.

Only one section, between Mogadishu to Kismayo, appears to be completely beyond government control.

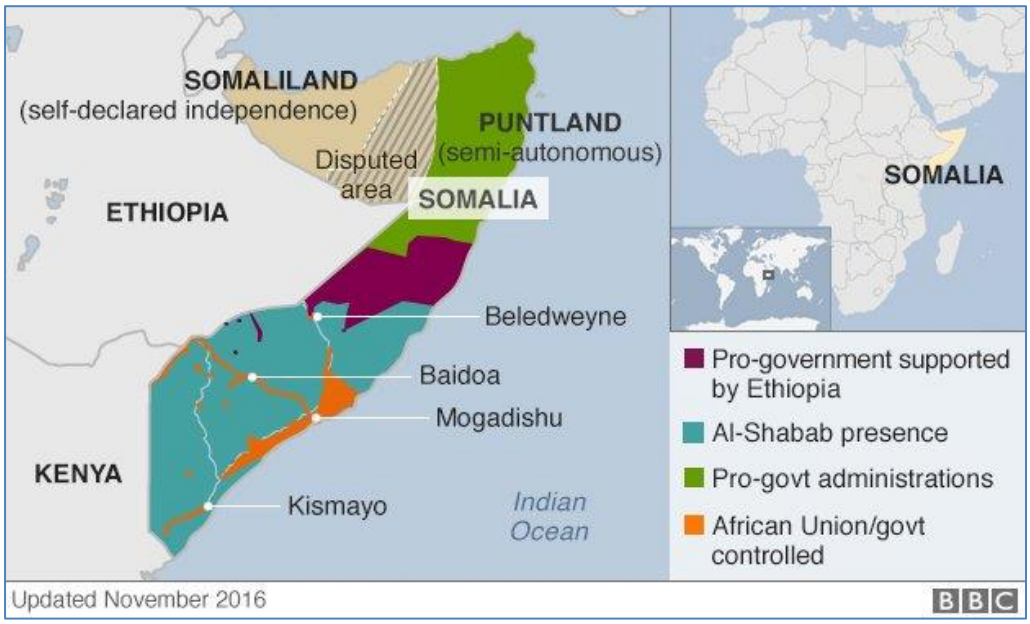
Fig. 13: Somalia government control map, 2015



(Source: BBC)

The situation appears to have worsened slightly in 2016, following the withdrawal of Ethiopian troops:

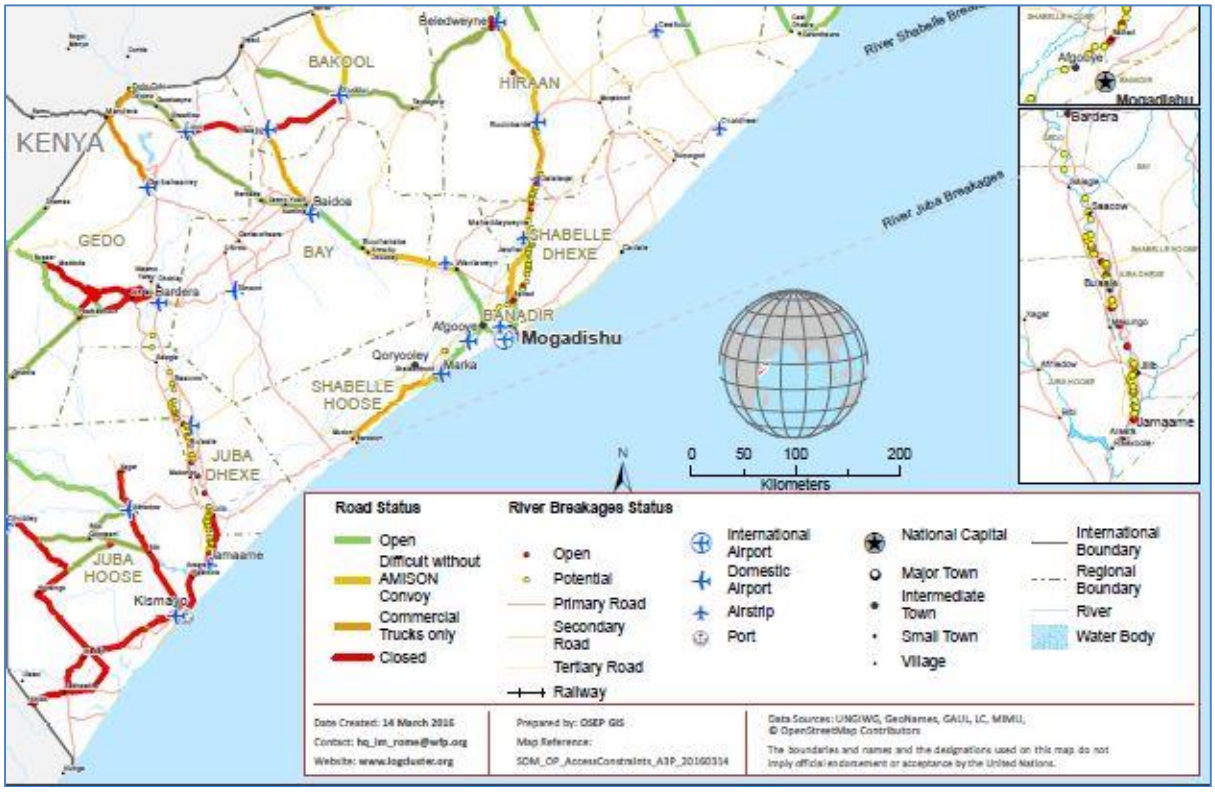
Fig. 14: Somalia government control map, 2016



(Source: BBC)

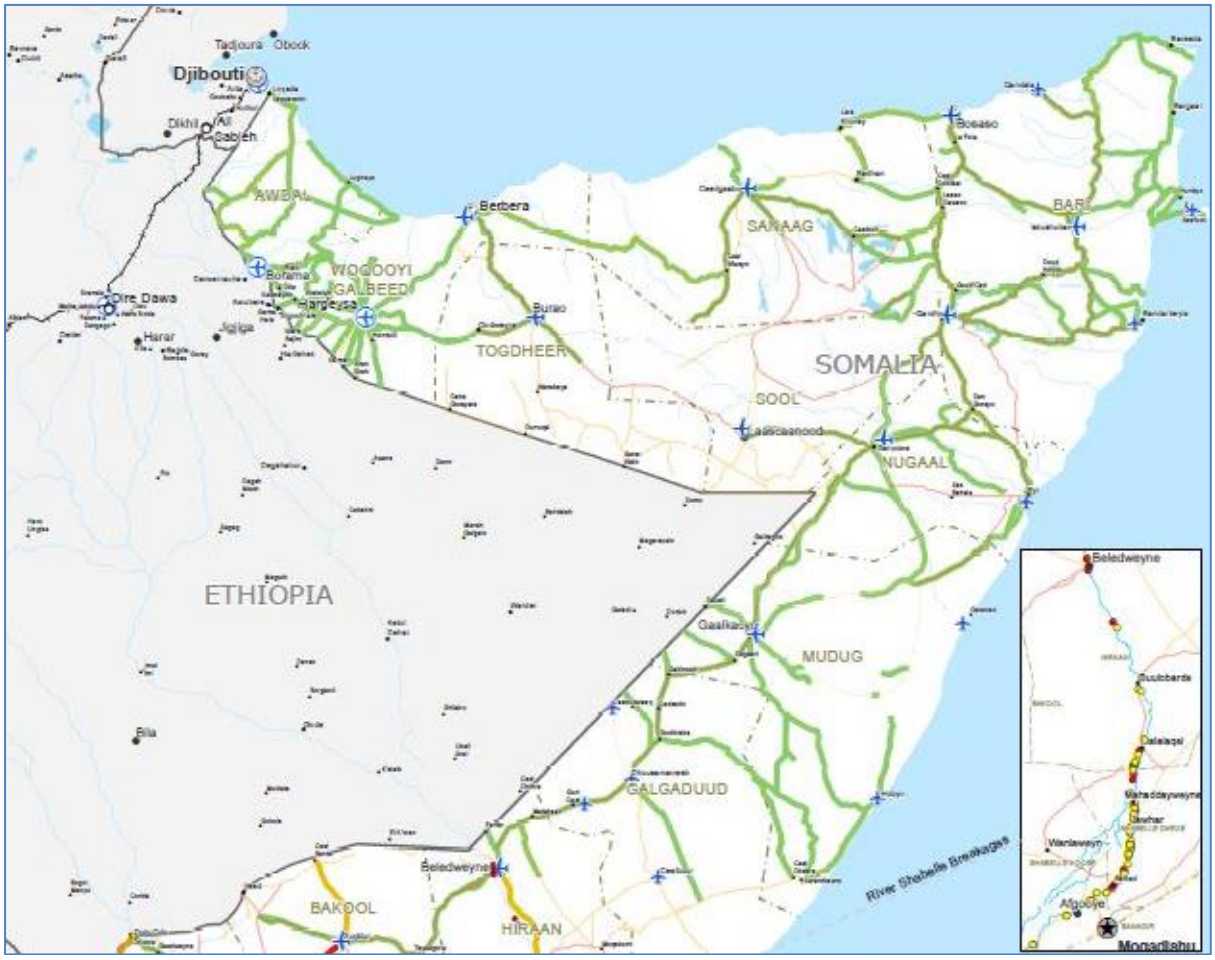
Road access constraints maps used by the World Food Programme (WFP) show a slightly more optimistic picture, with only a few roads in the deep south of Somalia marked closed.

Fig. 15: Somalia (south) road access constraints map, 2016



(Source: logcluster.org)

Fig. 16: Somalia (north) road access constraints map, 2016



(Source: logcluster.org)

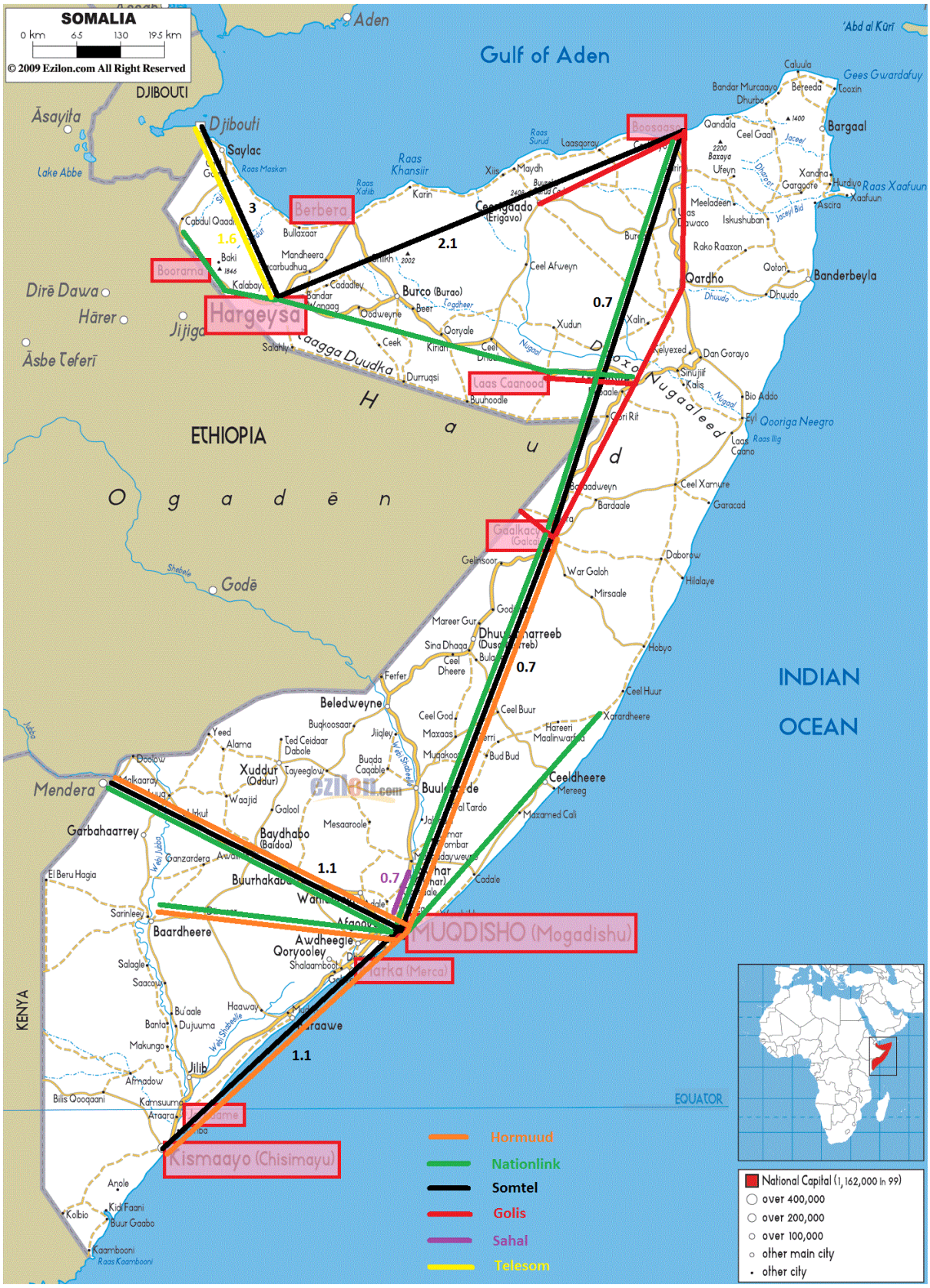
2.5.6 Non-terrestrial and wireless options

The national backbone network should consist primarily of fibre optic cable due to the superior capacity it offers compared to other technologies. Main trunks of the network will need to be able to carry hundreds of Gbps and ultimately several Tbps (see chapter 2.2), which is virtually impossible or at least not economically feasible using non-fibre solutions such as satellite or microwave radio links.

2.5.6.1 Microwave

In the absence of a national fibre optic backbone network, some major cities in Somalia are currently connected by microwave links as shown in the map below.

Fig. 17: Somalia microwave link networks[11]



(Map layer source: Ezilon)

[11] Simplified map. Actual routing between end points may include additional cities. Not all links may have been disclosed. Link capacities shown in Gbps where known.

Microwave radio links are significantly easier, quicker and cheaper per km to install than fibre optic cable, but current technology supports only up to 10 Gbps, with very recent successful trials achieving 20 Gbps over a distance of 13 km[12]. Longer distances can be achieved by doing multiple 'hops' with relay stations (but this increases the cost), or by using lower frequency bands, which do, however, offer less bandwidth to support link capacities of multiple Gbps. Total link capacity can be increased by multiplexing several carriers, but this also multiplies the amount of suitable frequency spectrum needed. Microwave is therefore unsuitable as a solution for main trunks of the national backbone network, but may be used for relatively short spurs off the main backbone to serve smaller towns and rural areas with relatively low capacity demand (see chapter 3.5.2).

According to the forecast in chapter 2.2, the university cities of Baidoa and Badhan (see chapter 2.5.2) with their populations of currently 80,000 to 90,000 each would not have bandwidth demand exceeding the capabilities of a microwave link to the main fibre backbone in the foreseeable future. However, the distance of both cities from the proposed main fibre optic backbone would mean that multiple microwave hops would be required in both cases. Baidoa may ultimately be served directly by a fibre route running from Mogadishu to the Ethiopian border at Doolow from where south-eastern Ethiopia could be supplied with international bandwidth. Nearby Mandera is another important entry point for international bandwidth into Somalia from NOFBI in Kenya (see chapter 3.4.1.4).

Microwave may also be an option for crossing territory where the security situation does not allow the deployment, operation and maintenance of fibre optic cable. However, the same capacity and distance limitations as described above apply.

Microwave is currently used by Hormuud and possibly Nationlink (to be confirmed) to connect Kismayo to Liquid Telecom's fibre optic network at the Kenyan border at Liboi. Considering that this is another important entry point for international bandwidth into Somalia, it also represents a critical capacity bottleneck. However laying fibre along this route is probably not possible at the present time due to the Al-Shabaab presence in the area.

The same is true for the Mogadishu-Kismayo route which also runs through Al-Shabaab territory. Hormuud and Somtel operate microwave links on this route, but without an improvement of the security situation in this area, Kismayo would remain cut off from international fibre optic connectivity to both Mogadishu and the Kenyan border.

2.5.6.2 Domestic submarine cables

An alternative solution for the Mogadishu-Kismayo route (see chapter 2.5.6.1) would be a subsea cable connecting the two cities, but this would be significantly more expensive than a terrestrial route (see chapter 2.6). However, the cost could be reduced by implementing this link as part of the planned DARE cable (see chapter 2.5.7).

There are several examples in Africa of domestic subsea cables connecting major coastal cities, e.g. in Angola, Mozambique, Algeria and Libya, avoiding difficult terrain or political boundaries as in the case of the Cabinda exclave in Angola which is depicted in the map below.

[12] Fierce Wireless, 11 Nov. 2016

Fig. 18: ADONES subsea fibre optic festoon cable (Angola)

(Source: Submarine Telecoms Forum)

The domestic subsea cables in Angola, Mozambique, Algeria and Libya are all implemented as so-called festoon cables, which have no offshore branching points. For a Mogadishu-Kismayo cable, the other configuration option with an offshore branching point may be advantageous. This is discussed in chapter 2.5.7.

2.5.6.3 Satellite

Like microwave (see chapter 2.5.6.1), satellite capacity is similarly limited below the needs of the national backbone network, and it is three to ten times more expensive than international fibre optic bandwidth (see chapter 3.4.4). Satellite technology may complement fibre optic and microwave links in Somalia's national backbone network to serve remote areas with low capacity demand.

2.5.7 Redundancy

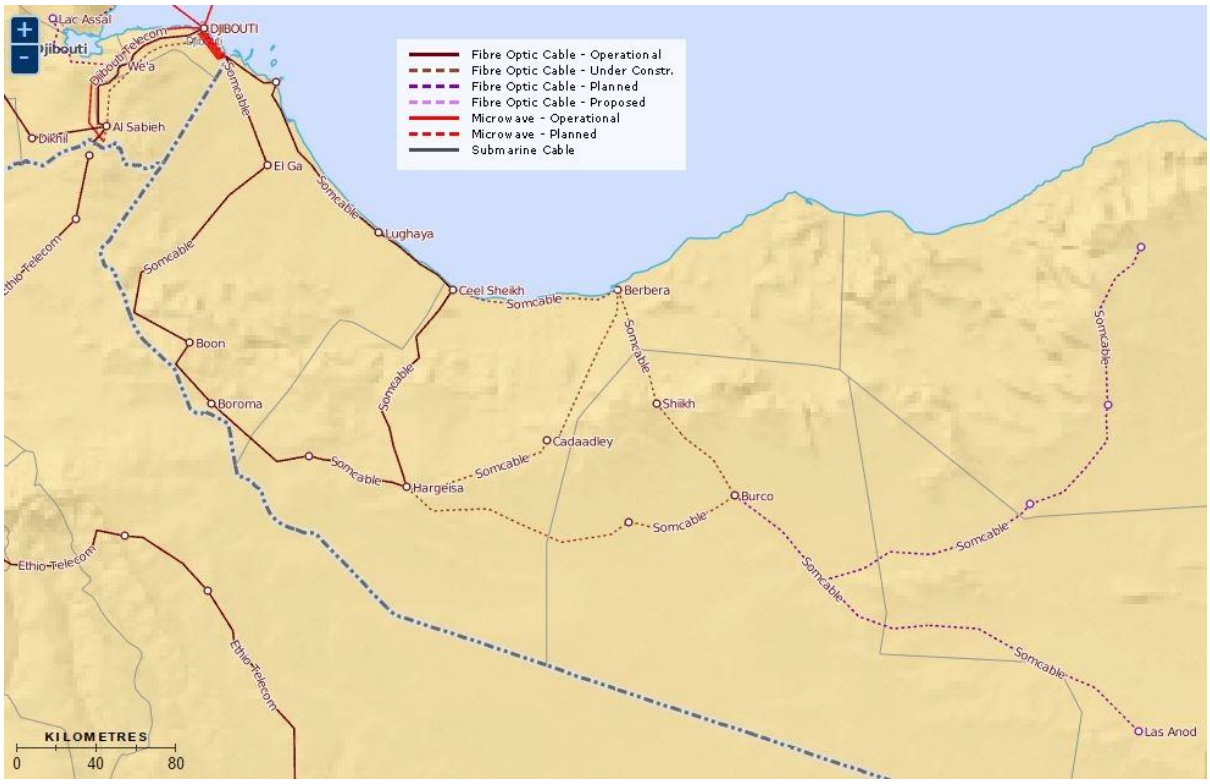
The terrestrial fibre optic network as proposed in chapter 2.5.1 consists mainly of a single backbone running from Kismayo and the Kenyan border in the south to Bosaso on the north coast, with a branch leading west from Garowe to the Djibouti border. A local failure at any point along such a single linear infrastructure means that the entire network beyond that point would lose service unless redundancy is provided.

A simple redundancy concept is the duplication of links, ideally geometrically/physically separated from each other (e.g. one underground and one aerial cable, or two underground cables buried on opposite sides of a road), but it is relatively costly and the redundancy effect is limited. However, this situation often evolves naturally in a competitive market when two or more competitors build infrastructure along the same route and lease capacity on each other's infrastructure as a backup. In addition, redundancy is built into each one of such duplicated infrastructures on the component level to reduce the risk and extent of network outages.

The most effective redundancy concept on the network topology level is the creation of ring structures. In the event of a local failure in a ring structure, almost any point along the ring can continue to be served by routing traffic the other (longer) way around the ring.

Due to Somalia's geography and the concentration of its main populations centres along very few major roads, there are no terrestrial ring structures in the initial backbone network topology proposed in chapter 2.5.1, they would only evolve in subsequent phases of development when additional fibre routes are deployed along minor roads and serving smaller cities and towns. Such ring structures are already emerging in Somaliland where Somcable is in the process of closing a fibre loop from Djibouti to Berbera via Hargeisa and back to Djibouti along the coast, and a second loop including Hargeisa, Berbera and Burao (Burco).

Fig. 19: Somcable fibre optic network in Somaliland

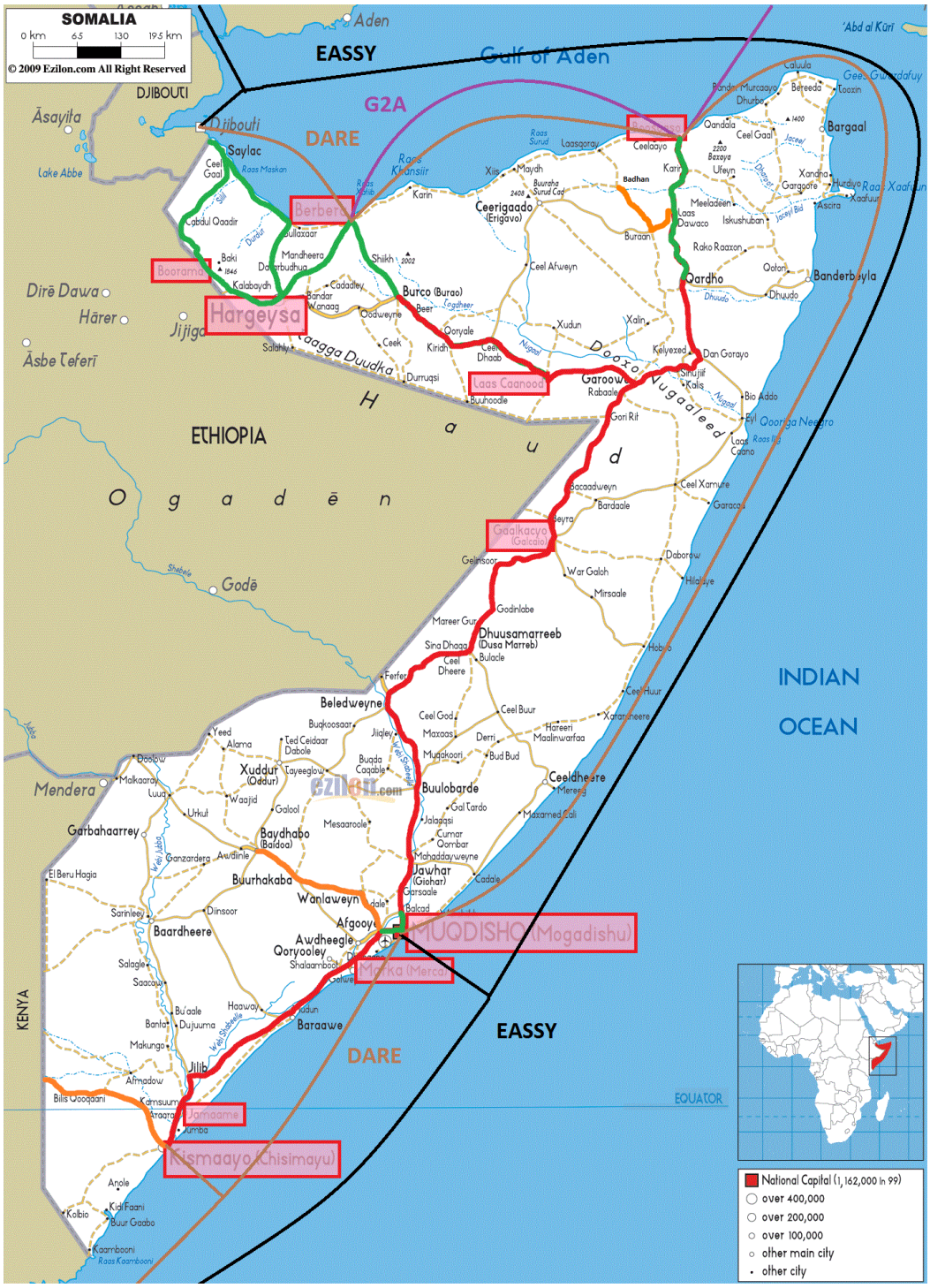


(Source: ITU)

While not containing ring structures within itself, the proposed initial phase of the terrestrial national backbone network for Somalia would create several 'super rings' in combination with existing and planned subsea fibre optic cables such as EASSY, G2A and DARE, thus opening up additional markets for the subsea cables in the interior of the country as well as improving the overall resilience of the combined network against outages.

One such ring would run from Berbera via Garowe to Bosaso and back to Berbera via a subsea segment on both the G2A and DARE cables. Another ring would run from Mogadishu via Galkayo and Garowe to Bosaso and back to Mogadishu via a subsea segment on the DARE cable.

Fig. 20: Somalia terrestrial and subsea backbone network combined



(Map layer source: Ezilon)

A third ring would ultimately be created once terrestrial fibre can safely be deployed in the far south of the country (see chapter 2.5.5), running from Mogadishu via Kismayo into Kenya and back to Mogadishu from Mombasa via a subsea segment on both the EASSY and DARE cables.

In the meantime, as discussed in chapter 2.5.6, an option to connect Kismayo would be via a branch off the DARE cable between Mogadishu and Mombasa. It is not yet known whether the DARE and G2A cables will be implemented as festoon systems or using offshore branching points. The disadvantage of offshore branching points is that they are more difficult to access for repairs or modifications than

the onshore landing stations where the different segments of a festoon cable are joined. However, in the case of Kismayo an offshore branching point may be considered so that the Mombasa-Mogadishu segment of the DARE cable would be unaffected by possible disruptions on land in Kismayo.

2.5.7.1 Microwave

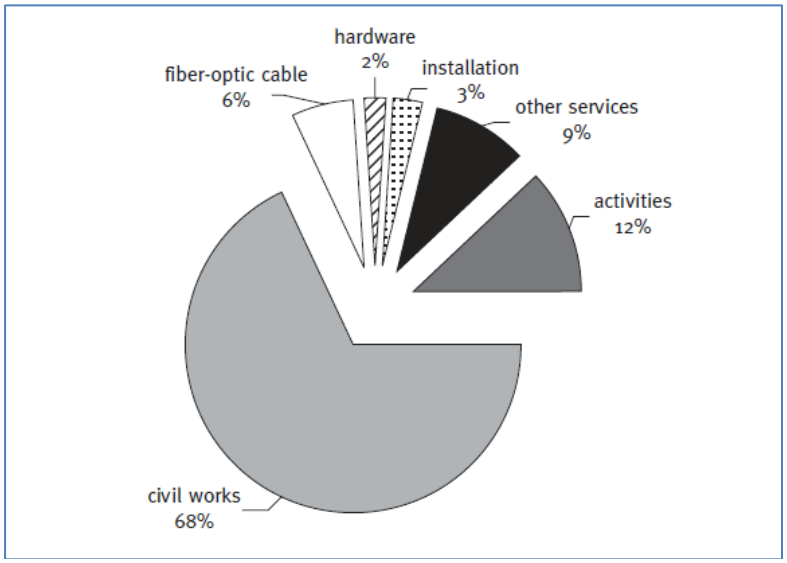
Very limited backup capacity would also be provided by existing microwave links along the proposed fibre optic backbone (see chapter 2.5.6.1).

2.6 Medium-term budgetary requirements

The cost of building a nationwide fibre optic network in Somalia is difficult to estimate because very little reference data is available. So far, fibre has only been deployed in Mogadishu and Somaliland, both of which may not be entirely representative for the rest of the country where a lack of basic infrastructure, challenges with security etc may lead to higher costs.

The limited information that is available indicates that it has cost between US$18,000 and 20,000 per km to lay fibre in Mogadishu. Hormuud has spent as little as US$14,000 per km, taking advantage of lower labour costs. Cost information from Somaliland operators had not yet been received at the time of submission of this report, but the local Road Development Agency (RDA) estimates the civil works to lay fibre are around US$15,000 per km, which would result in a total cost of around US$22,000 per km considering that civil works represent approximately 70% of the total. The higher cost compared to Mogadishu would be expected when the deployment includes not just metropolitan fibre but inter-city fibre routes as well which involve moving equipment, personnel, fuel etc over greater distances for longer periods of time.

Fig. 21: Fibre optic network deployment cost structure



(Source: Broadband for Africa 2010, based on OECD data 2008)

In neighbouring Kenya, operators have spent on average between US$16,000 and US$19,000 per km to lay fibre across various parts of the country. Despite higher labour costs compared to Somalia, the lower overall cost is likely to result from the better support infrastructure in Kenya, more competition between specialised firms, and machinery replacing some of the manual labour.

For an initial budget estimate for a nationwide fibre optic network rollout in Somalia it seems sensible to use the high end of the above mentioned figures (US$22,000 per km) and apply a 10-15% safety margin for factors such as poorer support infrastructure along some routes, higher costs for security etc, i.e. a total cost of US$25,000 per km on average.

The following routes would need to be built according to the network plan described in chapter 2.5.1:

Fig. 22: National fibre optic backbone network cost estimate

Route	km	US$/km	Total cost (US$ million)
Mogadishu - Garowe	948	25,000	23.7
Garowe - Qardho	206	25,000	5.2
Garowe - Burao	384	25,000	9.6
Mogadishu - Kismayo	483	90,000 25,000	44.5 12.1
Mogadishu - Baidoa	244	25,000	6.1
Kismayo - Liboi (Kenya)	245	25,000	6.1
Waiye - Badhan	180	25,000	4.5
Total	**2675**		**99.7 67.3**

Note: Figures in blue apply if the Mogadishu-Kismayo route is implemented as a submarine cable instead of terrestrial cable.

Implementing the Mogadishu-Kismayo route as a submarine cable instead of terrestrial due to the security situation in the far south of Somalia (see chapter 2.5.6) would increase the cost of this route significantly to as much as US$43.5 million (based on a cost of US$90,000 per km for relatively short cables recently deployed in the Mediterranean[13]), thus driving the total cost of the backbone network up to around US$99.7 million (including an estimated cost of US$1 million to build a landing station in Kismayo). If this option is chosen, it is therefore strongly recommended to encourage the consortium implementing the DARE submarine cable to include Kismayo as an additional landing point, which would significantly reduce the overall cost.

2.7 Social and environmental impact of infrastructure development and mitigation strategies

A preliminary assessment of the environmental sensitivity of areas affected by the proposed national backbone project and social impacts of its implementation was carried out for a number of selected sites and locations. The assessment comprises a desktop study involving the analysis of the proposed cable route and project maps, as well as literature review of previous studies along the proposed route.

[13] Telegeography 2014

The selected sites and locations for the assessment are:

- Mogadishu
  - Warta Nabadda (Hormuud, SON)
  - Hodan (Hormuud, SON, Somcast, Somali Wireless and others)
  - Wadajir (SON)
- Hargeisa
- Bosasso

2.7.1 Anticipated impacts of the national backbone project

Anticipated positive impacts during construction

- Creation of employment
- Creation of markets for project development materials
- Increased business opportunities for local traders
- Increased revenue to the Government through taxes

Anticipated negative impacts during construction

- Interference with local infrastructure including access routes, water supply lines, among others
- Increased exposure to risks and accidents
- Loss of incomes due to interference with socio-economic activities
- Relocation and separation of communities
- Increase in demand of materials including ballast, gravel among others

Anticipated positive impacts during operation

- Creation of employment
- Increase in bandwidth capacity
- Development of the project area, for example opening of industries, increase in ICT use, use of irrigation, among others

Anticipated negative impacts during operation

- Electromagnetic interference with radio telecommunications systems

2.7.2 Suggested mitigation strategies

- Desk review of available documentation on the project
- Consultations with the proponent regarding the proposed project details, site planning and implementation plan
- Thorough field investigations along the proposed line route, photography, surveys, informal discussions with people from the immediate neighbourhood
- A participatory rapid assessment method using tools including literature review, questionnaires, observation, geographical positioning system device (GPS)
- A number of household interviews along the project corridor
- In-depth interviews to be held with district heads of departments, provincial administration, NGOs, and faith-based organisations
- Evaluation of the project setting and baseline conditions
- Consultative public participation in the communities residing along the proposed cable route
- Analysis of the potential impacts of the proposed project on the biophysical and socio-cultural/economic environment

- Formulation of appropriate mitigation measures and development of an environmental and social management plan, monitoring plan, and guidelines for capacity building in environmental and social management
- Reporting results to communities and authorities at national and subnational levels

2.7.3 Guideline

In the absence of a comprehensive national guideline and regulatory framework on environmental and social impact assessment and management on infrastructural development projects, we recommend the World Bank Safeguard Policies and Environmental Assessment Source Book Volume II be used as a guide to social and environmental safeguards. It is incumbent on implementing companies and relevant authorities to utilize available international standards until a legal and regulatory framework is established.

3 Component 2: Regulatory, commercial and technical issues

3.1 Proposed licensing framework for facilities-based telecom operators

3.1.1 Somaliland: Existing monoply license for Somcable in Somaliland

Somcable holds a 25-year exclusive license to provide fibre optic infrastructure in Somaliland. There has been criticism of the monopolistic nature of the arrangement and also of the allegedly low license fee paid for it. The authors of this report have requested but have not been provided the opportunity to review the license.

Whatever the terms, the long period of the exclusive arrangement would require a regulatory response under international best practice. The goal of the Somaliland regulator, and that of the FGS, should be a competitive environment that provides optimal services to businesses and the public at an optimal price. In order to achieve that goal, pricing for operators and end-users and operator access to networks would have to be reviewed to ensure that Somcable is not able to engage in anti-competitive behaviour. The way in which Somcable profits from its current arrangements in Somaliand would also need to be considered, particularly as Somcable and other potential operators' services and infrastructure are rolled out across the area governed by the FGS (and thus outside the geographical limits of Somcable's Somaliland license) according to the plans above.

3.1.2 FGS: Analysis of and recommendations for the national licensing framework for communications generally

The Licensing Framework and Business Plan Report (the "Licensing Report") provided to the Ministry of Information, Post and Telecommunications of the FGS in May 2015 by Albany and its partner Incyte Consulting under their on-going regulatory project with the World Bank analysed the licensing framework proposed for the FGS by the draft National Communications Act of 2014 (the "Bill) and made recommendations to bring its implementation in line with international best practice. As also discussed above, it is assumed that the Bill will be adopted and constitute the piece of legislation most relevant to the fibre optic backbone discussed in this report. The licensing framework is summarized here only very briefly, and the full Licensing Report is attached as an annex to this report to provide further detail. As referenced above, the relationship between institutions of the FGS and any similar, overlapping institutions in Somaliland will necessarily be part of larger constitutional discussions, and impact on the communications sector will have to be considered subsequently.

3.1.3 FGS: Application of the licensing framework to deployment of the national backbone

With its definition of "licence," the Bill suggests that its licensing authority extends only to retail service providers, i.e., those that supply "to the public." Similarly, the definition of a "telecommunications service" licensed under the Bill is limited to operators providing telecommunications "directly to the public for a fee."[14] This limited application to retail providers ignores the fact that wholesale networks and services should also be authorised by licence under international best practice. There may be licensees who want to have a purely wholesale business model, and they should be permitted to do so. For example, submarine cable landing station operators are often purely wholesale and are typically licenced. Absent amendment to the Bill the issue of wholesale service provider licensing will need to be clarified in subordinate regulations.

3.1.4 FGS: Recommended amendment to legislation prior to passage

If possible, consideration should be given to amending the Bill so that telecommunications network operators and service providers that supply telecommunications services only on a wholesale basis (for example, a submarine cable landing station operator or an electricity generator that leases trunking capacity on its fibre optic network to telecommunications operators) are brought within the new telecommunications licensing regime, and will be obliged to obtain a licence (and pay an annual licence fee), insofar as their activities involve the operation of a telecommunications network or the provision of a telecommunications service. This could be achieved by amending the definition of "licence" in Article 2 of the Bill, although a more substantial revision of the licensing provisions in Articles 38–41 would be preferable. Similar changes to other definitions should be considered for consistency.

3.1.5 FGS: Licenses required under the Bill

Various communications services will depend upon, and be relevant to, the fibre optic backbone discussed here. The Bill proposes the following types of communications licenses for services and networks provided to the public.

---

[14] Definitions relevant to this discussion, from Article 2 of the Bill, are as follows:

1. "License" shall mean the authorization issued by the Commission that allows Broadcasters and Telecommunications Service Providers to use radio frequency spectrum resources and to provide the specified service to the public.

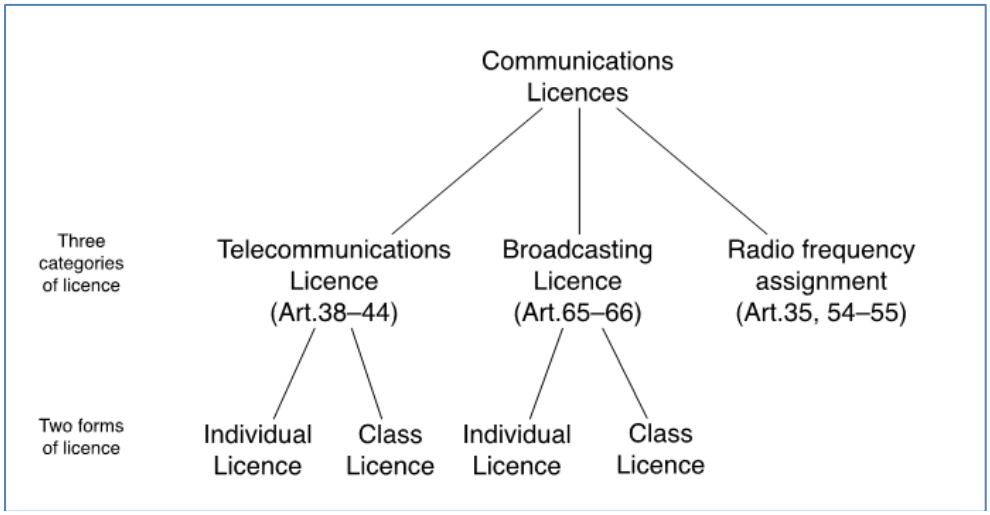
2. "Telecommunications" shall mean the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received.

3. "Telecommunications Network" shall mean the facilities by which a Telecommunications Service Provider makes Telecommunications Services available to the public or to a private network.

4. "Telecommunications Service" shall mean the provision by a Licensee of the conveyance of Telecommunications for a fee directly to the public.

5. "Telecommunications Service Provider" shall mean an entity authorized by the Commission pursuant to Title VI of this Act to provide Telecommunications Services.

Fig. 23: Structure of the Communications licensing regime envisaged in the Bill



3.1.6 FGS: Distinction between individual and class licenses

The Bill envisages that telecommunications suppliers and broadcasters will be licenced by way of either an Individual Licence (also called a Private Licence in some translations of the Bill) or a Class Licence (also called a General Licence in some translations of the Bill). The principal differences between the two types of licence are:[15]

1. Individual Licences may be granted by way of an auction if demand is greater than the available supply (Art. 41(3–4);
2. Individual licences may only be issued by the Commission on the recommendation of the Director General, except if the licence is being issued by way of an auction (Art. 41);
3. The Commission may seek additional information from an applicant for an Individual Licence before deciding whether to grant the application (Art. 41(7);
4. Differences in the terms of Individual Licences are permitted but must be objectively justifiable (Art. 41(8). Having significant market power (SMP) in a relevant market is grounds for additional or different licence conditions. (Art. 41(9));
5. An acquisition of ten per cent or more of the equity of an Individual Licensee must be notified to the Commission (Art. 41(14)).

[15] An earlier draft/translation of the Bill included an additional difference between an individual licence and a class licence, namely that individual licences are granted 'on terms specific to that entity' whereas the terms of Class Licences are to be identical for all Class Licensees supplying equivalent services. This is a common distinction between individual and class licences internationally; however, it is no longer evident in the current draft/translation of the Bill.

Fig. 24: Legislative framework for use of individual and class licences

	May be issued as an Individual License?	May be issued as a Class License?
Operation of a Telecommunications Network	Yes. This is explicitly provided for in Article 39(1). However, the Commission should formally identify the communications services that require an Individual License. (Art.38(3))	Yes. This is explicitly provided for in Article 39(1). However, the Commission needs to formally identify the communications services that require an Individual License. (Art.38(3))
Supply to the public of a Telecommunications Service	Yes. This is explicitly provided for in Article 39(1). However, the Commission should formally identify the communications services that require an Individual License. (Art.38(3))	Yes, but only if the Telecommunications Service does not require the use the radio frequency spectrum or numbering resources (Art.41(15)). And the Commission should formally identify the communications services that require a Class License. (Art.38(3))
Operation and provision of Broadcasting Services	Yes. This is explicitly provided for in Article 39(1).	Yes. This is explicitly provided for in Article 39(1). (Note though that an earlier draft/translation of the Act (at Art.26(b)) explicitly prohibited the use of Class Licensing to authorise any Broadcasting Services.

3.1.6.1 FGS: Recommendations regarding distinction between individual and class licenses

The class licensing regime envisaged for the FGS by Article 39(2) of the Bill involves a full and individualised application process and the Commission giving the successful applicant as physical licence document. This does not represent international best practice in relation to class licensing under which operators would typically need only to comply with a set of standardised obligations in order to be considered lawful and possibly also register (as distinct from apply for a specific authorisation) prior to commencing the supply of service.

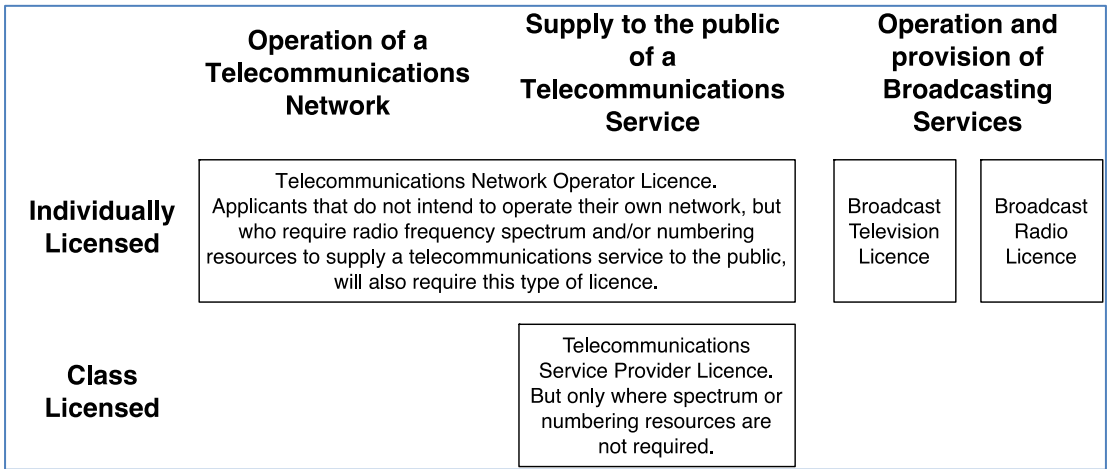
The Bill also establishes some significant constraints around the use of class licensing but does leave it to the Commission to determine 'the communications services that qualify for Class or Individual Licences or that are exempted from licensing' (Art. 38(3)). Being able to determine which services will be class licensed and which will require individual licences would usually have a substantial impact on the ultimate structure and administrative complexity of a licensing regime. However, because of the constraints in the Bill around the use of class licensing and what it means in Somalia, the determination of which services will be individually licensed and which will be class licensed serves chiefly to identify the services to which special licence conditions may be attached. (It may also provide an easy way of distinguishing between licensees for the purposes of levying different annual licence fees.)

The Bill significantly limits the potential to use class licensing as a means of lowering legal and regulatory barriers to market entry and enabling fast-tracked entry into particular market segments. Accordingly, the simplest implementation of the Individual Licence/Class Licence distinction would in

this case also be the most appropriate and practicable. This approach is shown in the figure immediately below and would see the creation of four licence types:

1. A Telecommunications Network Operator Licence, a Television Broadcast Licence and a Radio Broadcast Licence, all of which would be issued as Individual Licences; and
2. A Telecommunications Service Provider Licence, which will be issued as a Class Licence but only where the supply of the telecommunications services in question does not require use of either numbering resources or the radio frequency spectrum.

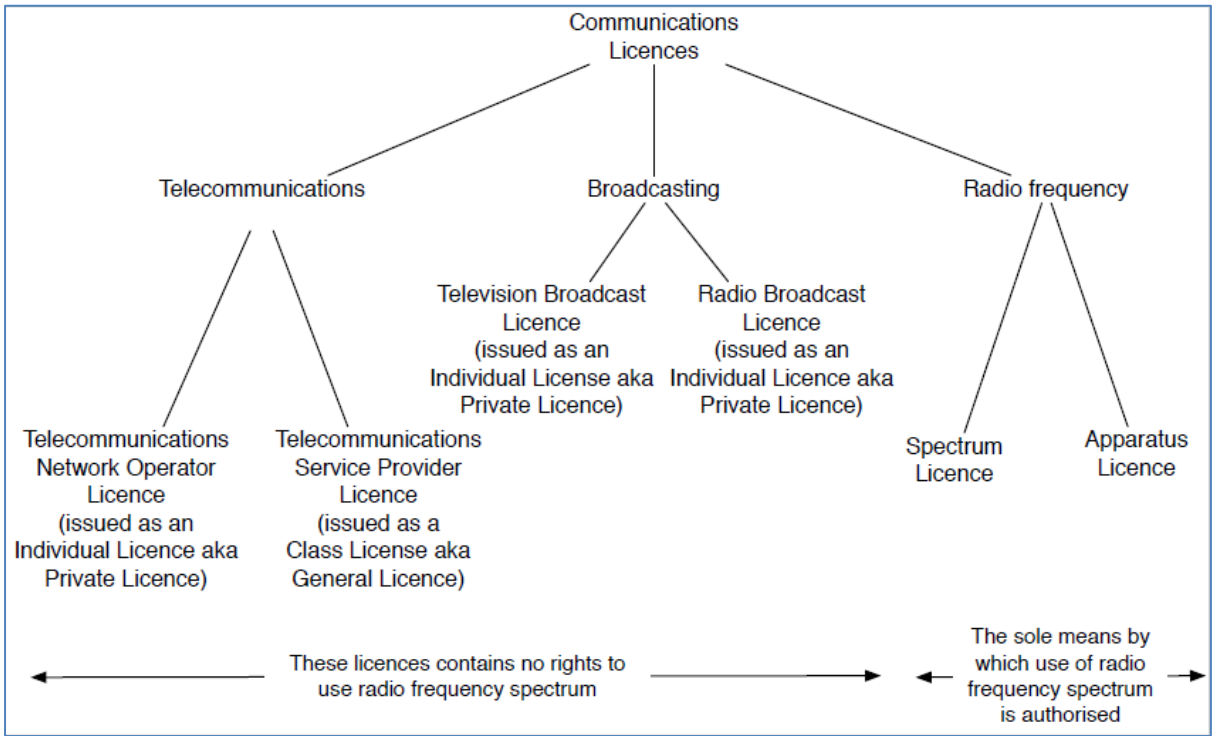
Fig. 25: Proposed implementation of individual / class licensing regime



3.1.6.2 FGS: Licensing framework if regulatory recommendations were incorporated

The structure below shows the licensing framework if the regulatory suggested in the Licensing Report were made clarifying the suggested distinctions between Individual and Class Licenses:

Fig. 26: Overview of the proposed types of communications licence



3.1.6.3 FGS: Overview of recommended licensing arrangements

The following chart summarises recommended licensing arrangements if other regulatory changes suggested are adopted regarding license duration, fees and other key provisions.

Fig. 27: Summary of proposed licensing arrangements

Ref.	Aspect	Proposal
1	Licence types	1. Telecommunications Network Operator Licence (issued as an Individual Licence) 2. Telecommunications Service Provider Licence (issued as a Class Licence); 3. Television Broadcast Licence (issued as an Individual Licence); 4. Radio Broadcast Licence (issued as an Individual Licence); 5. Spectrum Licence 6. Apparatus Licence (divided into various sub-types to reflect different types of radio equipment and uses)
2	Eligibility	1. Corporations; 2. A natural person who is a citizen of Somalia over the age of 18 years; 3. Partnerships, charitable trusts, incorporated society, or other body organised under a law of Somalia that has capacity to contract; 4. Embassies and foreign consulates (for radio communications licensing only)
3	Obtaining a licence	1. All processes will involve application to and approval by the regulator. The regulator will be required to provide reasons in writing in the event that an application is refused. 2. The information that must accompany an application, together with the matters that the regulator is to take into consideration in assessing an application will be set out in the relevant licensing regulations (i.e. in the Telecommunications Licensing Regulations for Telecommunications Licences, in the Radio Frequency Licensing Regulations for radio frequency assignments.)
4	Limits on the number of licences	1. No limitations on the number of Telecommunications Licences or Broadcasting Licences. 2. Spectrum availability will determine the limitations on the number of Spectrum Licences.
5	Licence duration	1. 15 years for Telecommunications Network Operator Licences 2. 5 years for Telecommunications Service Provider Licences 3. 10 years for Television Broadcasting Licences 4. 7 years for Radio Broadcasting Licences 5. 10–15 for Spectrum Licences, depending on the particular assignment 6. 5 years for Apparatus Licences
6	Licence conditions	1. Majority of conditions to be set out in the relevant licensing regulation as standard licence conditions that will apply to all.

Ref.	Aspect	Proposal
		Standard licence conditions will not to be replicated in the licences themselves. 2. Licensing regulations to provide for the imposition of special licence conditions on Individual Licences in relation to a limited list of topics, such as: a) network rollout obligations; b) any specific legacy obligations that may need to be retained through licence condition until a relevant regulation or industry change is made; c) conditions necessary for compliance with international law or funding arrangements.
7	Licence fees	1. A fixed fee amount (in SOS) plus, if more than a specified level of revenue is earned, a variable fee based on a specific percentage of the licensee's gross revenue for Telecommunications Licensees and Broadcasting Licensees 2. A fixed fee (in SOS) for Apparatus Licences 3. A fee determine by reference to a formula that takes into account the scarcity, location and value of the particular spectrum holdings of a Spectrum Licensee. 4. Licensees will be required to provide the Commission with requested information to enable the Commission to invoice the licensee for the appropriate licence fee.

3.2 Right of way issues

Right of way is a legal instrument that involves both public and private use of land and facilities that are maintained and regulated under the law. It is acquired for or devoted to building facilities such as roads, railroads, or utility facilities for the purpose of the mobility of people and products; water supply and wastewater treatment, energy and communication systems etc.

Currently, Somalia lacks effective control, management and coordination of rights of way for infrastructure development projects. For instance, rights of way often require legal arrangements, coordination of different levels of government, technical expertise and involvement of both the public and private sector.

3.2.1 Limited control

The Federal Government of Somalia is currently not in full control of all the regions in the country. Large swathes of land are in the hands of non-state actors, mainly Al-Shabaab. On the other hand, authorities in Somaliland exercise full control and authority in much of the northern cities. This remains a challenge for implementation of a uniform set of rights of way regimes in the country.

3.2.2 Management and coordination

The process of attaining rights of way throughout Somalia varies depending on regions and whether proposed fibre optic deployment is in urban centres or outside city limits. In urban centres, authorities at the municipal level have jurisdiction to manage rights of way. In areas outside of city limits, the subnational authorities currently exercise that right.

Thus far, Hormuud Telecom, Somali Optical Network (SON), Somcast, and Somalia Wireless have deployed fibre optic networks in Mogadishu. These companies relied on public rights of way for installing their networks along public roads within the city. To do so, the Ministry of Posts & Telecommunications provided a permit to install the network. Banadir Regional Administration (BRA), Mogadishu's municipal authority, then granted them another permit delineating the proposed route of the project. Municipal officials stated that there is a department tasked to review, advise and monitor proposed projects.

While deployment of fibre optic networks in Mogadishu was successful, the process of attaining rights of way was haphazard and lacked adequate oversight. The fees associated with the issuing permits also varied. In fact, in July 2016, municipal authorities began levying a US$2 tax per meter on all future fibre optic cable deployments within city limits.

In Puntland, Golis Telecom has completed the deployment of 450 km of fibre optic cable along the main road connecting the port city of Bossaso to Qardho. The company paid only a one-time permit fee of US$100,000 to the Puntland Government for the entire project. The Puntland Ministry of Environment is tasked to monitor project impact.

3.3 Governance arrangements for cooperation between the private and public sector

3.3.1 Reasons for Establishing PPPs

In simple terms, a PPP arises from an agreement between the government and private organizations to develop, operate, maintain and market a network by sharing risks and rewards. Specifically, PPPs can reduce operational risk for the public sector and capital risk for the private sector, while providing the joint benefit of more rapid project delivery. With PPPs, the government has direct access to expert project management skills from the private sector, as well as access to private capital.

PPPs are particularly useful when markets fail, e.g., where the private sector is unable or unwilling to invest, or because of short-term investor confidence issues. As such, PPPs provide an opportunity for the public sector to support the private sector in overcoming commercial hurdles and to further public policy goals. PPPs can encourage investment in areas where the private sector would otherwise see no commercial reason to go—in rural, economically disadvantaged, or otherwise underserved areas, for example. They can also incentivize investments in contexts with very high start-up and fixed costs and low initial rates of return.

PPPs are useful because public sector investment alone often lacks efficiency and incentives. They can also provide utility where the private sector is unable to negotiate access to rights of way or otherwise have access to required areas of land or sea. They also can provide better coordination and synergies among infrastructure investments (e.g., roads, railways, pipelines), as discussed in greater detail below.

However, as also discussed below, there are downsides to creating PPPs. For instance, PPPs can fall apart when trust or governance structures are weak. Additionally, PPPs can be complex to structure if partners have conflicting interests, and this complexity can create lengthy delays. It is therefore in the interests of all parties to keep the PPP structure as simple as possible. [16]

3.3.2 Role of public sector:

The public sector will necessarily be involved in project oversight, even as private sector stakeholders implement the project. Public sector officials will have key roles in determining project scope, project procurement development, monitoring and evaluation of the project's progress, determination of any sanctions and renegotiation of any requirements. Public sector involvement is also required to provide the high level political support—the visible and credible public champion—that the project will require for ultimate success. The public sector will have to work with the private sector to develop and execute a public information campaign to inform the public of the value of the project.

But, what can be done when the government lacks capacity to govern generally, let alone to manage complex multi-stakeholder cooperation that broadband development will require? Elsewhere governments have taken on outside consultants and secondments from international organisations (such as the World Bank) or the private sector, and they commonly develop dedicated PPP units to work potentially across multiple projects, as discussed below.[17]

3.3.3 PPP Units

According to a 2007 World Bank report, PPP units are structured differently across different environments in order to address the particularly needs of the environment and the lack of public sector capacity that the PPP unit is designed to address. For example, the unit's function, location within government, and ultimate control can vary. However, PPP units generally have the following responsibilities:

- Guidance on national legislation, including on which sectors are eligible for PPPs and which PPP methods and schemes can be implemented.
- Procurement and ultimate approval and rejection of PPP projects.
- Provision of technical support to government organisations in identifying, procuring, evaluating and managing projects.
- Provision of training and otherwise building capacity of relevant public sector officials.
- Promoting PPPs within the private sector.

A 2013 World Bank review found, however, a general lack of quantitative evidence that PPP units necessarily provide greater value than individual ministries or government agencies charged with oversight of sector-specific projects. The review did note, however, that, despite the dearth of quantitative data, there are widespread perceptions on the importance of a well-functioning PPP unit for the success of a country's PPP.[18]

What factors determine how successful a PPP unit will be? The 2007 World Bank report mentioned above drew the following conclusions:

---

[16] (Gallegos, 2012); personal communications with World Bank staff.

[17] World Bank (2007) "Public-Private Partnership Units: Lessons for their designs and use in infrastructure

[18] *Alberto Lemma. "Literature Review: Evaluating the Costs and Benefits of Centralised PPP Units". EPS PEAKS.*

- Deficiencies in government (weakness, corruption, etc.) tend to be mirrored in the PPP units they develop.
- As with a PPP project generally, high-level political support is required for a PPP unit to be effective.
- Effective PPP units have been developed to address a specific need and have a clear understanding of how existing government institutions fail to meet that need.
- PPP units with greater executive powers are more effective than those with only advisory functions.
- In parliamentary systems, such as that of Somalia, successful PPP units are generally attached to ministries of finance, as such ministries are accustomed to coordinating across multiple government functions and ministries, managing fiscal risk, and wielding the power of the treasury and withholding payment to enforce compliance.

3.4 International connectivity issues

3.4.1 Existing international fibre entry points

There are currently four entry points for international fibre optic bandwidth that the national backbone network would be able to connect to:

1. The landing station of the EASSY submarine cable in Mogadishu
2. The terrestrial cable at the Djibouti border in Somaliland
3. The terrestrial cable at the Kenyan border near Liboi
4. The terrestrial cable at the Kenyan border near Mandera

3.4.1.1 EASSY landing station in Mogadishu

The EASSY landing station in Mogadishu is operated by Dalkom Somalia. Dalkom currently has 100 Gbps of the cable's total capacity of 4.72 Tbps and sells international wholesale bandwidth to telcos and ISPs, including the closely affiliated Somali Optical Networks (SON) which operates two metropolitan fibre rings in the city (see chapter 3.5.1).

The official pricing given by Dalkom in early 2015 was US$90 per Mbps per month under an Indefeasible Right of Use (IRU) option, and US$296 under a lease option including IP transit. However, the actual cost of leased capacity varies from around US$250 to US$400 per Mbps per month, and the price difference is not always consistent with differences in volume. For example, one ISP is paying US$300 per Mbps per month for a volume of only 50 Mbps while others are paying the same for three to nine times the volume, and yet another is paying only US$240 per Mbps per month for a volume of 100 Mbps.

3.4.1.2 Somcable terrestrial fibre to Djibouti

There are currently four submarine fibre optic cables landing in Djibouti:

- EASSY (4.72 Tbps)
- EIG (3.84 Tbps)
- SEACOM (1.28 Tbps)
- SEA-ME-WE-3 (960 Gbps)

Two additional cables are planned: SEA-ME-WE-5 with a capacity of 24 Tbps, and AAE-1 (40 Tbps).

Being a Djibouti-owned company, Somcable was able to build its own terrestrial fibre route from the Somaliland border to the landing station in Djibouti. In May 2016 the company had 2.5 Gbps of international bandwidth, of which 1.9 Gbps were currently used. The entire bandwidth is used by Somcable's own retail arm, SO. All other operators in Somaliland have chosen to connect to the landing station in Djibouti via microwave links and not to use Somcable's terrestrial fibre backbone, probably in a boycott of Somcable's 25-year exclusive fibre licence in Somaliland (see chapter 3.4.7). In May 2016, Somtel was preparing an upgrade of its microwave link to Djibouti from 3 to 7 Gbps. Telesom has 1.6 Gbps of microwave bandwidth to Djibouti and also operates a microwave link to Ethiopia.

3.4.1.3 Liquid Telecom terrestrial fibre (Kenya)

Liquid Telecom has extended its fibre optic network in Kenya to Liboi at the Somali border. It is connected to three international submarine fibre optic cables in Mombasa: EASSY (4.72 Tbps), SEACOM (1.28 Tbps) and TEAMS (40 Gbps). Hormuud is connected to the network by microwave link.

3.4.1.4 NOFBI terrestrial fibre (Kenya)

Kenya's national optic fibre backbone infrastructure (NOFBI) has been extended to Mandera at the Somali border with a lit capacity of 2.5 Gbps as of December 2016. However, there have been some cable cuts along the route and not all of the 24 fibre cores are available end-to-end.

Hormuud, Nationlink and Somtel operate microwave links from Beled Hawo on the Somali side of the border to Mogadishu (see chapter 2.5.6.1). Somtel's link has a capacity of 1.1 Gbps.

3.4.2 Ethiopian fibre optic network

Ethio Telecom has extended its national fibre optic backbone network to the Somaliland border at Wajale where it meets up with Somcable's fibre network. Ethio Telecom is buying bandwidth from Djibouti Telecom for US$49/Mbps/month.

Golis operates a microwave link from Galkayo to Galdogob on the Ethiopian border, but the fibre optic network has not yet reached the border on the Ethiopian side.

3.4.3 Horn Of Africa Corridors Program (formerly Berbera Corridor)

Formerly known as the Berbera Corridor Program, the Horn of Africa Corridors Program is a subset of the wider Horn of Africa (HoA) Initiative, a US$1.8 billion joint initiative of the World Bank Group (WBG), the Intergovernmental Authority on Development (IGAD), the African Union (AU), the United

Nations (UN), the Islamic Development Bank (IsDB), the European Union (EU) and the African Development Bank (AfDB). As of October 2016, the program includes two ICT-related projects:

1. **Construction of a submarine cable linking Berbera to Djibouti, with possible extensions to Asmara and Bosaso**
   This project is under preparation with initial funding from PPIAF. Its cost has been estimated at US$30 million and the WBG has been identified as a funding partner. However, it now seems likely that the private sector may be able to cover a large portion of the expected cost as part of the DARE cable project. The International Finance Corporation (IFC), the private sector arm of the WBG may invest in the DARE cable if invited to do so.

2. **Activating fibre optic cable backhaul from Berbera to Hargeisa and Harar in Ethiopia**
   This project is also under preparation with initial funding from PPIAF. Funding of advisory services worth US$10 million is under discussion, including the establishment of a Public-Private Partnership (PPP) management structure or a Special Purpose Vehicle (SPV). In addition, part of the estimated US$135 million construction cost of an energy interconnector transmission line along this route may be used for laying fibre optic cable, including a branch from Hargeisa to Burao. This would cost an estimated US$10.8 million for the 430km within Somaliland (from Hargeisa to Berbera, Hargeisa to Burao and Hargeisa to Wajale at the Ethiopian border), using the US$25,000 per km estimate from chapter 2.6. However, Somcable has already laid fibre from Hargeisa to Wajale and is in the process of completing routes to Berbera and Burao, so that it may be considered to redirect funding from the HoA program to other fibre routes that the private sector has not yet addressed.

3.4.4 Satellite

Outside of those areas in Somalia with direct fibre optic access to international bandwidth (Mogadishu-Afgoye-Balcad and parts of Somaliland) and those with access via microwave backbone networks (see chapter 2.5.6.1), satellite is the only available option for international connectivity in large parts of Somalia.

3.4.4.1 VSAT

At between US$800 and US$1,200 per Mbps per month, Very Small Aperture Terminal (VSAT) bandwidth is relatively expensive. This is the price range paid by small operators in Somalia for bandwidth between 10 and 20 Mbps. Large users of VSAT bandwidth such as Golis (several hundred Mbps) have not disclosed price information, they may receive similar volume discounts as large users in South Sudan, the only other country in the region without a fibre optic backbone network, who pay as little as US$450 per Mbps per month.

3.4.4.2 O3b Networks

O3b operates a network of Medium Earth Orbit (MEO) satellites, offering lower latency than geo-stationary VSAT satellites (150 ms round trip as opposed to 500 ms). The lower latency is one reason why the company's products are sometimes referred to as "Fibre via satellite". However, in terms of bandwidth, O3b cannot match the capacity of fibre. It has ten beams per region, providing 1.6 Gbps each.

In Somalia, as of mid-2016, O3b provides a combined total of 2 Gbps of bandwidth to five customers (Hormuud, Telesom, Golis, Somtel and the United Nations) at seven sites across South-Central Somalia, Somaliland and Puntland. More detailed information was not disclosed. Golis uses 200 Mbps of O3b bandwidth but didn't disclose price information.

3.4.5 Planned additional international submarine fibre optic cables

3.4.5.1 G2A

The Gulf to Africa (G2A) cable was an initiative by Omantel, Ethio Telecom and the Hormuud/Telesom/Golis group to connect Salalah in Oman to Bosaso (Puntland) and Berbera (Somaliland), with terrestrial onward connectivity into Ethiopia. An extension from Bosaso to Mogadishu was under consideration, with another landing station in Hobio from where an additional terrestrial fibre route could provide international bandwidth to the Mudug, Galmudug and Hiraan regions and Eastern Ethiopia.

Despite the fact that there are no international submarine fibre optic cables landing in Salalah and bandwidth would have had to be transported there from Muscat (reportedly for a flat fee of US$1 million), Omantel had announced it would ultimately be able to offer international bandwidth to Somalia at US$1 per Mbps per month.

However, the venture fell apart in mid-2016 for a combination of reasons. Somcable was challenging the legitimacy of G2A, quoting its exclusive 25-year fibre optic cable licence in Somaliland. Reportedly there had also been pressure from the Djibouti government, favouring the DARE cable (see chapter 3.4.5.2) in which Djibouti Telecom is involved.

Both Telesom and Golis had already invested more than US$5 million each into G2A over a period of 17 months, out of a committed total of more than US$10 million each over three years. The Djibouti government reportedly offered to reimburse this if G2A was dropped in favour of DARE. A survey had already been carried out for the Salalah-Bosaso segment of G2A but did not proceed to Berbera due to concerns that the Somaliland authorities may seize the survey ship. The Somaliland Ministers of Telecommunications and Ports both lost their jobs as a result of the dispute between Telesom and Somcable.

3.4.5.2 DARE

The Djibouti Africa Regional Express (DARE) cable will connect Djibouti, Mocha (Yemen), Berbera, Bosaso and Mogadishu, with a possible extension to Mombasa and Dar es Salaam. The extension south of Mogadishu was called into question when Kenyan mobile operator Safaricom pulled out of the consortium. However, Liquid Telecom and other Kenyan operators remain committed to the project, and Djibouti Telecom has offered to increase its stake from US$20 million to US$30 million to cover the shortfall. The total cost of the cable is estimated at US$100 million.

Hormuud, Telesom and Golis have set up a Special Purpose Vehicle (SPV) which will operate the landing stations and have contributed US$67 million to the project. Other partners include Somtel, TeleYemen and Africa Marine Express.

Fig. 28: DARE cable map

(Source: Africa Review)

3.4.6 Other existing international submarine cables

There are two other international submarine fibre optic cables running along the African East Coast which could theoretically add competition to the Somali market: the 1.28 Tbps SEACOM cable with landing points in Mombasa and Djibouti and onward connectivity to South Africa, India and Europe, and the 40 Gbps TEAMS cable connecting Mombasa to Fujairah in the UAE.

3.4.7 Summary of market conditions

International fibre optic connectivity in Somalia has improved in recent years with the landing of the EASSY cable in Mogadishu, Somcable's fibre connection to other submarine cables in Djibouti, and terrestrial fibre networks in Kenya and Ethiopia having been extended to the Somali border. However, the current market structure is far from ideal. In the absence of regulatory oversight, monopoly situations and conflicts of interest between wholesale and retail business units of major players have arisen.

Both landing points of international submarine fibre optic cables in the region are currently monopolies in their respective markets. The EASSY landing station, operated by Dalkom, is the only one serving the Mogadishu region, and fibre optic access to Djibouti Telecom's landing station is exclusively provided by Somcable under a 25-year monopoly licence for Somaliland. The two regional markets are not interconnected by fibre optic cable, which would create competition between the two providers in both markets. The existing microwave backbone networks across the country (see chapter 2.5.6.1) cannot provide sufficient capacity for this purpose.

The terrestrial fibre landing points at the Kenyan border (NOFBI and Liquid Telecom, see chapter 3.4.1) are currently completely isolated from any major retail market due to the lack of a fibre optic backbone in Somalia.

In addition, both providers of wholesale international fibre bandwidth are also involved in the retail sector, which exposes the market to the risk of anti-competitive behaviour and pricing. Somcable serves retail customers through its subsidiary or sister company SO, and Dalkom appears to be at least closely affiliated with Somali Optical Network (SON) which operates two metropolitan fibre rings in Mogadishu. The ownership of Somali companies is not always clear, as companies are not obliged by law to disclose their shareholder structure.

The DARE cable (see chapter 3.4.5.2) will bring competition to both currently isolated regional markets, Mogadishu and Somaliland, but it will also create another monopoly situation with the landing station in Bosaso (Puntland) until other international cables land there or a national fibre optic backbone interconnects the different regions and providers.

The wholesale/retail conflicts of interest can in the short to medium term only be resolved by regulation, mandating the separation of wholesale and retail businesses to ensure non-discriminatory access and fair pricing of wholesale bandwidth. Only in the long term, under intense competition between many wholesale providers can this be left to market forces alone.

3.5 Technical connectivity options, including rural areas

This section describes technical options for connecting wholesale customers (telcos and ISPs) to the national fibre optic backbone network. The technical facilities and equipment used for these connections may be operated either by the national backbone network operator or the wholesale customer. In either case, the colocation of some equipment will be required at the other party's premises.

For the sake of completeness, chapter 3.5.3 briefly describes technical connectivity options in the access layer where retail customers are connected to the network, even though the access network will not be the domain of the national backbone PPP. Wholesale and retail service provision should be strictly separated by regulation to avoid conflicts of interest that arise when a wholesale provider competes with its own customers on the retail level. However, due to the absence of regulation for over two decades, precisely this situation has evolved in Somalia: providers of wholesale international bandwidth also operate as retail service providers or are closely affiliated with one.

3.5.1 Metropolitan fibre

The technically superior way to connect to the national fibre optic backbone is itself by fibre optic cable. It provides the fastest data rates, lowest latency and highest reliability.

Metropolitan fibre networks already exist in some cities in Somalia, and many more are planned by various companies. They form an intermediate layer of connectivity between the national backbone and the access networks (see chapter 3.5.3) and are typically designed as ring structures, which provide the best protection against disruptions of service due to fibre cuts or equipment failures.

Aerial mounting is an option for metropolitan fibre in urban areas that are easier to police against theft and vandalism, compared to long-distance fibre routes between cities where the cable is typically buried underground (see chapter 2.5.3). The initial capital expenditure for aerial deployment is about

half compared to underground, but ongoing operational expenses for maintenance and repair are higher.

In Mogadishu, SON operates two fibre rings with a total length of 115 km and is planning a third one (35 km) for additional protection.

Hormuud has deployed fibre in Mogadishu (20 to 30 km) and reportedly in Kismayo and some other cities as well, but did not disclose further details.

Somcast has deployed fibre within the Mogadishu International Airport (MIA) compound, from the Dalkom landing station to its Network Operations Centre (NOC) and from there to 'KM4', a major intersection and business area in the city. The company has plans to extend the fibre from here to the Bakara and Hamarweyne areas.

ISP Airsom has 20 km of fibre in Mogadishu and is planning to deploy fibre in Galkayo, Garowe, Bosaso.

Several other companies have plans for metropolitan fibre deployments, as shown in the table below.

Fig. 29: Metropolitan fibre networks, deployed and planned, length in km

	Airsom	Golis	Hormuud	Nationlink	Sahal	Somcable	Somcast	SON	Tayocomm	Unitel
Adaado					20		<50			
Afgoye					?					
Baidoa				100	20		<50			
Beledweyne				100			<50			
Bosaso	600	?		200						
Erigavo		?								
Galkayo	400	?		250						
Garowe	300	?		200						
Hargeisa				300		70				
Hobio							<50			
Jowhar					20					
Kismayo			?	200			<50		5	
Laas Anod		?								
Marka					20					
Mogadishu	20		30	500	50		20 40	115 35		30
Qardho		?								

(Source: Company interviews)

In addition to the information in the table above, two companies have announced longer term plans to deploy metropolitan fibre in all major cities in Somalia: Somcom Telecom (3,000 km) and National Fibre Cable Co. (2,000 km).

Some of the figures should be taken as rough estimates only, expressed by staff members in interviews. Some companies were more restrictive in disclosing information than others. It should also be noted that not all planned deployments may go ahead in the near future. Nationlink for example has been reported to be in financial difficulties and may not have the resources for further infrastructure development at the present time.

3.5.2 Microwave

Current point-to-point (P2P) microwave technology supports up to 10 Gbps, with very recent successful trials achieving 20 Gbps (see chapter 2.5.6.1). Total link capacity can be increased by multiplexing several carriers, but this also multiplies the amount of suitable frequency spectrum

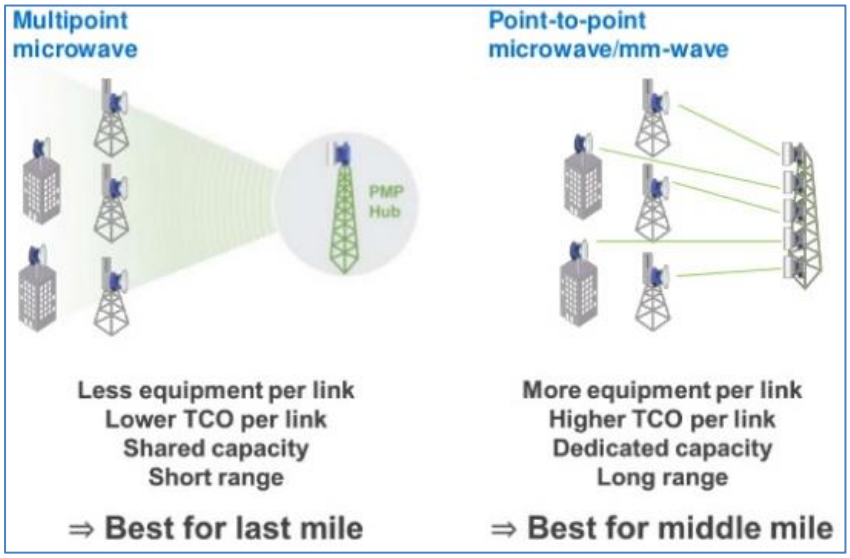
needed. Sufficient bandwidth for these high-capacity links is usually only available in very high frequency bands such as the millimetre bands around 60 to 80 GHz, which limits the maximum distance to around 10 km, requiring multiple hops for longer distances.

Many medium-sized ISPs in urban and peri-urban areas will be located within these distance limits from the national fibre backbone and have capacity needs that are within the capabilities of microwave technology, making it a viable option for connecting to the backbone from locations that are difficult to reach by fibre, or as an interim solution until fibre can be deployed.

Small ISPs in more distant towns or rural areas may have significantly lower capacity needs, so that they can use lower microwave frequency bands where distances of dozens or even hundreds of km can be achieved with a single hop, depending on the terrain.

Point-to-Multipoint (PMP) microwave systems provide connections to multiple sites from a single hub, as shown in the diagram below. They are typically used as a 'last mile' solution in the access network connecting end-customers (see chapter 3.5.3), but they can also be used to connect several smaller wholesale customers (ISPs with relatively low capacity demand) in a cost-effective way, or multiple sites of a single wholesale customer.

Fig. 30: PMP vs. P2P microwave systems



(Source: CBNL)

The bandwidth provided by PMP systems can be shared between the different connected sites, or dedicated amounts of bandwidth can be configured for each site. Link distances are typically around 5 km and hub capacity up to around 5 Gbps can be provided.

3.5.3 Access networks

The technical options described in chapters 3.5.1 and 3.5.2 (fibre and microwave) for connecting wholesale customers to the national backbone are also applicable in the access layer where retail customers are connected to the network.

Several operators in Somalia have started providing fibre optic connections all the way to the premises or homes of retail customers (FttP/FttH), or high-speed P2P microwave links as a substitute or interim solution. At this stage, the customers for these solutions are mostly large corporations, hotels,

embassies, NGOs or government ministries, such as the 15 federal ministries in Mogadishu that were provided with fibre optic connectivity by Dalkom. The bandwidth provided is typically not in the Gbps range as for some wholesale customers, but reaches tens of Mbps or, in the case of the 15 ministries in Mogadishu a combined total of 155 Mbps.

In Somaliland, Somcable has rolled out a Fibre to the Home (FttH) network to 3,000 homes in the Jigayar are of Hargeisa, at an average cost of US$300 per home, and is marketing services through its retail arm, SO. However, at only 4 Mbps maximum download speed, the technology is grossly underutilised.

Fig. 31: SO! (Somcable) retail broadband service offerings

(Source: Somcable, SO)

The vast majority of broadband customers in Somalia today, however, are gaining access through mobile broadband services, using EDGE (2.5G), 3G or 4G/LTE technology. As the example of SO's LTE service in the table above shows, these technologies' bandwidth capabilities are also underutilised, mostly due to the lack of an adequate backbone network and/or the relatively high cost of international bandwidth as a result of the existing monopoly situations.

The geographical reach of Somalia's mobile broadband access networks is unknown. In the absence of regulation, the operators are not obliged to publish coverage maps, and despite repeated requests, not a single operator has ever provided one. Some have stated that their network coverage is a business secret.

Since good network coverage is a selling point that operators elsewhere gladly advertise, it may have to be assumed that coverage in Somalia is not as extensive as the operators have sometimes casually stated, especially in rural areas where – again as a result of the lack of regulation – there are no minimum coverage requirements defined as licence conditions.

Knowledge of the current status of mobile broadband access coverage and the operators' future expansion plans would be valuable for a more targeted design of the national fibre optic backbone network.

4 Component 3: Capacity-building

4.1 Resources and skills assessment at the Ministry and future regulator

Local field researchers conducted a preliminary resources and skills assessment of the Federal Government of Somalia's Ministry of Post and Telecommunication (MoPT) and the subnational sector ministries of Puntland, Jubbaland, Interim Galmudug Administration (IGA), Interim South West Administration (ISWA) and Somaliland.

The team also accompanied a World Bank Group mission to Hargeisa, Somaliland for a field visit to various Somaliland Ministries including Ministry of Post and Telecommunications. The team also visited offices of all major telecommunications operators and interviewed senior executives.

The purpose of this assessment is to develop a training plan for key staff at the ministries and the future regulator.

4.1.1 Method

Field researchers conducted in-depth face-to-face interviews with principal representatives from the Federal Ministry of Post and Telecommunication, sector ministries of the Interim Jubbaland Administration, Interim Galmudug Administration, Interim South West Administration, Puntland and Somaliland. A questionnaire with both close-ended and open-ended questions was used to assess available financial and human resources.

Areas of inquiry in the assessment questions were:

1. The organisational structure and level of staffing
2. Budgets and expenditure breakdown
3. Academic background and experience of key staff
4. Training
5. Plans and level of coordination between federal and state ministries

Interviews were conducted in Mogadishu and Hargeisa, followed by telephone calls and emails with follow-up questions to ensure all areas of inquiry were covered adequately. In addition, the respondents were asked about availability of and status of plans to furnish facilities and office resources of their respective ministries in the recently formed Interim Jubbaland Administration (IJA), Interim Galmudug Administration (IGA) and Interim South West Administration (ISWA).

A review of national budget and appropriation documents was done to fully understand resources available to the ministries. The Finance Ministry and subnational authorities were asked to submit revenue reports in order to determine revenues from the sector to Federal Government and subnational authorities.

4.1.2 Ministry of Post and Telecommunication

The Federal Ministry of Post and Telecommunication has ten departments divided into ten directorates with fifty staff members holding college degrees and a few with postgraduate diplomas. Nevertheless, among key staff there is only a limited number with the technical skills required for the ministry's core functions.

Fig. 32: Federal MoPT annual budget (2015-2016)[19]

Year	Budget (US$)
2015	1,185,128
2016	1,182,111

(Source: Ministry of Finance, FGS)

Fig. 33: Federal MoPT budget expenditure (2015)

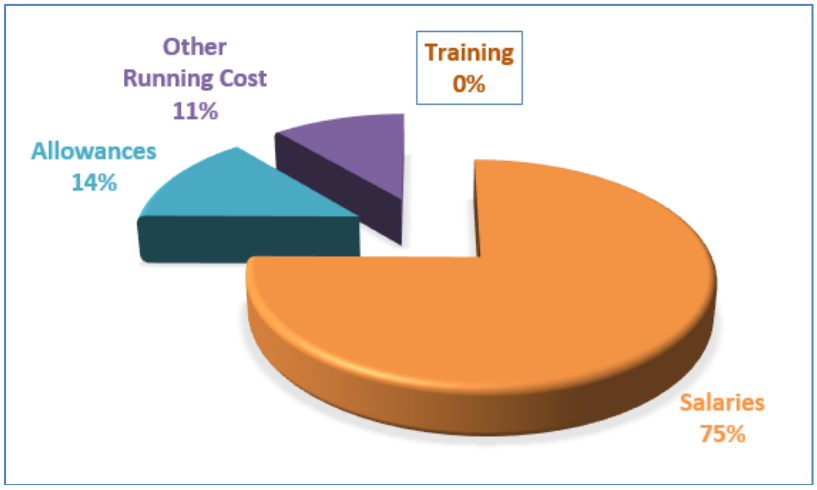
(Source: Ministry of Finance, FGS)

In 2015, the federal MoPT spent US$1,059,128 on wages and salaries, 89% of the annual budget. The remainder of the budget amounting to US$126,000 or 11% was spent on recurrent costs of goods and services. No amount was budgeted for training.

The ministry's annual budget for 2016 is US$1,182,111. It is expended on salaries, allowances and other operating expenses. The expenditure breakdown of the Ministry's budget is shown in the following graph.

[19] Federal Government of Somalia, Ministry of Finance, Appropriations Act of 2016

Fig. 34: Federal MoPT budget breakdown (2016)



(Source: Ministry of Finance

The ministry's Director General approximated that over fifty members of the staff hold university degrees. He added that the Ministry lacks key staff with the skillset necessary for the effective delivery of core technical functions. In his written response he cited budgetary constraint as the reason for not being able to recruit and retain qualified personnel. He writes: "There are qualified engineers working with operators but not employed by us. Retaining such people is not easy as the operators can pay them more and we can't."

4.1.3 Federal States & Regions

Federal States' ministries of telecommunication are at different stages of maturity with varying degrees of capacity and resources. Jubbaland, Southwest and Galmudug are newly formed Federal Member States of the Federal Government of Somalia.

4.1.3.1 Somaliland

The Somaliland Ministry of Post and Telecommunication has the necessary facilities, staff with relevant technical background including two telecommunications engineers and two technicians who can benefit from capacity building training workshops. Some of the senior technical experts are former employees of the Ministry of Post & Telecommunications of the last central government that collapsed in 1991. Because of the dramatic change of technology in this sector, they will require skills upgrades. In fact, the last time these technical experts received training was prior 1991.

Government institutions in Somaliland have existed formally since 1991. Although the existing institutional capacity requires a great deal of resource investment, they are substantively more mature than those of the Federal Government of Somalia and the newly formed subnational ministries.

The Ministry has a budget to support operational costs including salaries and other recurring costs. The government receives payments from telecommunications companies, although there is no formal regulatory framework or tax policy for the sector. The payments appear to be an arbitrary mix of taxes and licence fees. The amount collected varies significantly from year to year.

Fig. 35: Somaliland tax revenue from telecom companies, 2012 - 2015

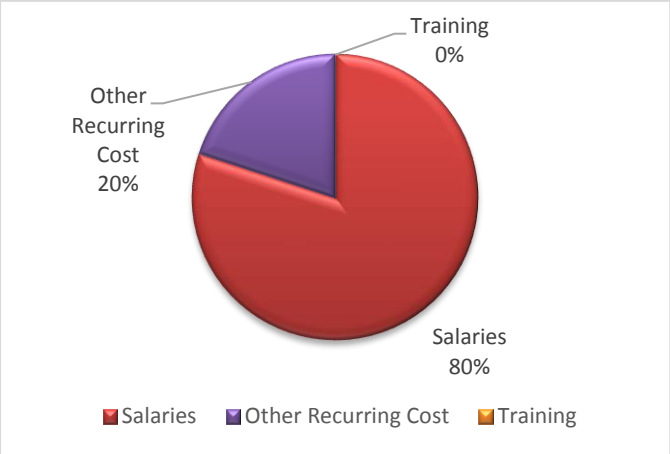
Operator	2012	2013	2014	2015	TOTAL
Telesom	402,474	435,555	454,752	205,000	1,497,781
Somtel	147,601	25,150	0	163,334	336,085
Africa Online	15,000	0	0	0	15,000
NationLink	0	0	12,546	0	12,546
SomCable	0	0	0	5,955	5,995
SO	0	0	0	0	0
TOTAL	565,075	460,705	467,298	374,289	**1,867,367**

(Source: Somaliland Ministry of Finance)

Although no licensing policy currently exists, the government collected a one-time flat fee of US$5,955 from Somcable for a communications license. The Ministry of Post and Telecommunications and ICT Commission's combined planning document for 2016-2019 includes the creation of an ICT sector standardisation and licensing framework as part of the National Development Plan's top priority projects.

The Somaliland government spends 80% of the budget on salaries, 20% on other recurrent costs, but none on training.

Fig. 36: Somaliland Government budget



Source: Somaliland Ministry of Finance

4.1.3.2 Puntland

Established in 1998, Puntland State had more time to develop public sector institutions. The Directorate of Telecommunications within the Ministry of Information, Communications, Culture, and Heritage (MICCH) is currently responsible for dealing with telecom operators as the subnational authority and managing related international donor projects of the sector. The Ministry currently hosts a project coordination unit (PCU), a component of the World Bank Group ICT Sector Support project that is providing support in the supply, installation and maintenance of communication rooms to government institutions and universities.

The official budget of the Ministry is US$1.2 million. However, recent budget shortfalls left room only for the payment of staff salaries, totalling approximately US$5,000 a month. This leaves no funds available for training and the ability to recruit and retain permanent staff with the relevant technical background.

4.1.3.3 Interim Jubbaland Administration (IJA)

The Interim Jubbaland Administration (IJA) is currently in the process of establishing institutional structures of its subnational ministries including the newly renamed Ministry of Information and Communication Technology as part of a recent political settlement that led to the appointment of a new Cabinet on May 19, 2016.

4.1.3.4 Interim South West Administration (ISWA)

The Interim South West Administration (ISWA) has an organisational structure in place. The Ministry of Post and Telecommunication is in the process of recruiting permanent key staff and has plans to renovate Ministry facilities. The officials in the Ministry have proposed an annual budget of US$217,000 that is yet to be approved by the State legislature.

4.1.3.5 Interim Galmudug (IGA)

The Interim Galmudug Administration's (IGA) Ministry of Post and Telecommunication has recently appointed senior leadership including a Director General. Ten staff members were also recruited so far and some of the CVs of key staff have been shared with the research team and will be included in the attachments.

The ministry has not developed a budget as of now and no training of key staff has taken place. An annual work plan is currently being developed.

4.1.4 Findings

Federal Member States' Ministries of Telecommunication are at different stages of maturity with varying degrees of capacity and resources. Jubbaland, Southwest and Galmudug are newly formed Federal Member States of the Federal Government of Somalia. Recruitment of key staff, construction and rehabilitation of facilities and securing sustainable operating budgets are some of the immediate priorities. There are planned and ongoing projects to support the federal states in establishing functioning subnational institutions.

4.1.4.1 Budgets

Both the federal MoPT and subnational Ministries of Post and Telecommunications assessed in this report face significant budgetary constraints. In addition, arrears and delayed payments of staff salaries and other recurring costs affect them. As a result, the Federal Government of Somalia does not provide budgetary support for the respective subnational ministries.

4.1.4.2 Key staff & training

The public sector lags far behind the thriving private sector, especially in the telecommunications sector. For instance, both the federal Ministry and subnational ministries lack staff with technical knowledge and experience in fibre optics, ICT regulatory policy, management of ICT sector development and PPPs. Recruitment and retention of qualified engineers, technicians and sector policy experts remains a significant challenge. The few available experts are absorbed by the private sector.

Recruiting staff with the necessary technical skills has been a challenge to all public sector institutions in the country. New graduates from universities are recruited despite not having the appropriate academic background in telecommunications, engineering and public policy. This public sector skills gap has been documented in previous UNDP studies.

The newly formed federal member states are expected to become beneficiaries of the public sector capacity injection initiative funded by the World Bank Multi Partner Fund (MPF), which will provide necessary technical expertise to develop skills in the public sector workforce.

While institutional capacity of the telecommunications ministries remains low, the surveyed institutions have staff with very different technical skill levels and experience. For instance, the Somaliland Ministry of Post and Telecommunication has staff with experience working for telecom operators with fibre optic technologies, network planning, telecommunications business planning, fibre deployment, test & measurement as well as project management in Somalia and abroad. However, the ministry does recognise the need for training to upgrade these skills as well as training related to postal services.

So far, the Federal Ministry and all subnational Ministries have not done formal staff development due to scarce financial resources.

4.1.5 Training plans and coordination

While there are ambitious work plans in existence or in the process of production, most of them address only the establishment of basic structures and facilities.

The federal State ministries have indicated the need for increased engagement and financial support in the form of budget support for key staff salaries from the federal MoPT. In addition, there is a political sensitivity involving Somaliland's status as an autonomous entity seeking international recognition and as such, there is no direct coordination between federal institutions and those in Somaliland.

The federal MoPT is taking the lead in setting overall ICT sector policy development and facilitation of capacity building support. However, leadership in the different Ministries of Telecommunication indicated strong willingness to receive capacity building support in ICT-related technical training workshops, in particular relating to fibre optic broadband.

While the leadership of regional State ministries and the federal Ministry expressed a willingness to collaborate more and share resources, there is little coordination of activities and plans at this time. Also, there is no sharing of financial or human resources. The World Bank funded ICT Sector Support project provides the supply, installation, and maintenance of communication rooms in key ministries in the different economic regions i.e. Puntland, Galmudug, Southwest, Jubbaland and Somaliland. Some of those interviewed suggested that this project will enhance coordination capabilities of federal government institutions and the regions.

4.2 Training plan for key staff and further capacity building options outside of the scope of this project

The Resources and Skills Assessment at federal and state ministries across Somalia (see chapter 4.1) has found that none of the surveyed institutions has conducted any systematic staff training since the

1990s, and none of them have allocated any funds for training in their budgets. Very few of the staff have the specific skills and experience required to fulfil the ministry's responsibilities of formulating, developing, administering and managing policies and laws for the country's ICT sector. This lack of capacity is part of the reason for the private sector's low level of confidence in Somalia's government institutions.

The complete lack of training in the past means that training is required not only in the specific context of the national fibre optic backbone project, but from the ground up. Given the government's limited financial resources, outside funding will be required.

A regulatory authority has not yet been established in Somalia. Its initial human resources will most likely have to come from the ministries, who will transfer staff or temporarily second them to the new institution. This means that ministry staff also need to prepare for carrying out the functions of the future regulator and its interaction with the private sector. The training program should therefore include a complete range of courses covering ICT policy and legislation, regulatory functions, ICT technologies and also ICT business basics, so as to develop a better understanding of private sector concerns.

It will be important that training is not simply 'off the shelf' but specifically addresses the particular environment and market conditions in Somalia. It should reach all staff levels, with an overview course for a broad audience, and more targeted advanced courses preparing staff members specifically for their designated roles.

A train-the-trainer approach should be incorporated at least for the basic courses, given the security-related difficulties of having foreign trainers travel to the country. It will also reduce the cost of training in the medium to long term and ensure that new staff can be trained in a timely manner.

The following training courses are recommended:

- Telecommunications and Broadband Overview
- Telecommunications and Broadband Technologies
- Telecommunications and Broadband Infrastructure Planning
- Telecommunications and Broadband Business Planning and Management
- Telecommunications and Broadband Legislation and Regulation

Technology, regulatory and business aspects of the national fibre optic backbone project and the planned PPP structure for it can be incorporated in these training courses.

4.3 Summary of training and knowledge transfer delivered during the assignment

A one-day training was held in Mogadishu on 19 November 2016 at the office of the Project Implementation Unit in Villa Somalia. In attendance were ten officials from the Somali Ministry of Post and Telecommunications and three engineers from Hormuud, Nationlink and Somtel. The training was conducted by Peter Lange and Kelly Cameron.

The Deputy Minister of Post and Telecommunications welcomed the training consultants on behalf of the Federal Government of Somalia and expressed appreciation to the World Bank Group for the capacity building training to key personnel from the Federal Ministry and telecom operators. He

emphasised the need for continued technical assistance and trainings for the Somali government, and reaffirmed the FGS's commitment to passing the Communications Act.

Peter Lange's presentation addressed broadband infrastructure and regulation. He started by giving a background on different technologies and the evolution of broadband in the telecommunications industry. He then gave an overview of broadband services in Somalia and challenges in this area including the lack of regulation, limited international connectivity, lack of a national fibre backbone infrastructure, security constraints and limited resources in the telecom sector in general. Finally, he elaborated on the advantages of a PPP structure for developing a national backbone network in Somalia and the need for more efficient regulation and spectrum management.

Kelly Cameron's presentation focused on communication regulation in Somalia. He gave a background of the various stages of the currently unapproved draft Communications Act. He covered the areas the Communications Act would impact such as creating a legal framework for the telecom industry, security, licensing, service provision to underserved areas, and establishing an impartial arbiter in the form of the National Communication Commission.

Feedback and recommendations received from stakeholders during the training session are included in chapter 6.1.

5 Component 4: PPP options

5.1 PPP institutional design and capacity requirements

A PPP, by definition, is a partnership between public and private sector entities; in other words, between government institutions and private sector companies. Both sectors have a particular history in Somalia, as well as various current issues to consider when designing an institutional structure for a PPP to build and operate a national fibre optic backbone network in the country.

The telecommunications sector in Somalia is entirely private. The state-owned Somali Telecom did not survive the collapse of the government in 1991, government institutions stopped functioning and eventually ceased to exist. Private actors picked up the pieces and started building a telecom industry which, under the given circumstances, has made some remarkable achievements in the past two decades, as described in chapter 2.1.

The public sector is no longer involved in the operation of telecom infrastructure or the provision of telecom services. Government institutions, including the Ministry of Post and Telecommunications are now slowly being rebuilt, but they suffer from chronic funding shortages due to a lack of sufficient government revenue. Systematic staff training has not been carried out since the 1990s (see chapter 4), so institutional capacity remains weak. A regulatory authority for the telecom sector has not yet been established.

This combination of circumstances in the Somali ICT sector calls for an institutional PPP structure that is led by the private sector, with government support in certain areas (see chapter 5.1.3) and basic regulatory principles embedded in the structure itself or in the PPP agreement.

5.1.1 Private sector functions

The Somali telecom industry has over the past two decades developed the expertise and resources necessary for building, operating and maintaining a national fibre optic backbone network. Operators have rolled out nationwide mobile networks, microwave backbones, metropolitan fibre rings, and some long-distance fibre routes. They are operating these networks successfully and profitably, have forged partnerships and entered into commercial supply and service agreements with international equipment vendors and local sub-contractors, for example in construction. International submarine fibre optic cables have successfully been landed in the country, and joint efforts are underway to develop new cable systems and landing stations connecting cities across all three economic zones – Somaliland, Puntland, and South-Central Somalia – with economic interests trumping political divisions. Business plans have also been developed for terrestrial long-distance fibre links across the regions.

There are also deficiencies in market development that have resulted from the completely unregulated environment that the private sector is operating in (see chapter 2.1), but the successful track record of Somalia's telecom operators and their experience under the particular conditions in the country qualify them for filling the major technical and operational roles in a PPP for a national fibre optic backbone network, including:

- Network design and engineering
- Procurement
- Network construction
- Project management
- Business planning and administration
- Marketing and sales
- Network operations and maintenance
- Billing and collection
- Customer service and support

Reputable international telecom operators as PPP partners would also possess the skills and qualifications needed for carrying out the above functions, but since to date no major international telco has been operating in Somalia, they would lack the country-specific experience of the local operators. On the other hand, their wider international experience, a more broadly trained workforce, and possibly greater bargaining power in procurement and negotiating global interconnection and content deals would be advantageous.

5.1.2 Selection of private sector partners

A fundamental question for the institutional design of the PPP is which players from the private sector should participate. Apart from the technical and operational strengths and weaknesses of international and local Somali telecom operators discussed in chapter 5.1.1, other important factors to consider are:

- Existing infrastructure
- Regulatory and competition aspects
- Funding

Existing Somali operators as PPP partners would have the advantage of existing network infrastructure that they can bring into the venture. However, apart from Somcable in Somaliland and to a lesser extent Golis in Puntland (see chapter 2.5), there is not a lot of existing infrastructure that would become part of a national long-distance backbone network. Fibre optic infrastructure in South-Central Somalia is so far mostly limited to metropolitan fibre rings in Mogadishu and some other cities (see

chapter 3.5.1). However, the operators in Somaliland and Puntland are rapidly expanding their long-distance fibre networks, and plans for this exist in South-Central Somalia as well.

On the other hand, existing Somali telecom operators as PPP partners for the national backbone network would be facing a potential conflict of interest between wholesale and retail operations, which would need to be dealt with through regulation or (see chapter 5.1.4).

In terms of the funding required for building a national network, it appears that the local private sector in Somalia would be able to come up with the bulk of it. The finances of Somali telecom operators are not known in detail since they are not obliged to disclose financial information, but as the available information about the DARE submarine cable shows (see chapter 3.4.5.2), the Hormuud/Telesom/Golis group alone was able to contribute US$67 million to that project, around two thirds of the total estimated cost, with state-owned Djibouti Telecom providing the bulk of the balance. The first phase of a national backbone as described in this report would cost roughly the same amount, between US$67 and 100 million (see chapter 2.6).

It is also possible, however, that the local telecom industry's financial resources may be stretched following the heavy investment into the DARE cable, and that international investment would be required in addition. Potent international telecom companies, or non-sectoral private sector investors such as banks (domestic and international) or venture capital firms would certainly be able to come up similar amounts, but not many may be willing to invest to this extent inside Somalia at this stage, without clear regulatory frameworks and investment protection mechanisms.

5.1.3 Public sector participation

The public sector's ability to contribute to a nationwide fibre network in Somalia is limited for the reasons discussed above. Even without these limitations, governments (in any country) should not necessarily get directly involved in the operation of telecom infrastructure or the provision of telecom services; the private sector is usually better positioned for that. However, there are areas where government participation in a PPP would be beneficial especially in the Somali context.

Firstly, the government has access to funding sources that are not available to the private sector, such as the World Bank and other lenders that serve public sector clients only. Significant contributions to the national backbone network could come from these sources (see chapter 3.4.3).

Government funding may be required especially for the expansion of infrastructure into areas that are not economically lucrative enough for the private sector to address on its own, for example rural areas. This is likely to become more relevant in later phases of the national backbone network rollout, but the initial phase described in this report also contains opportunities such as the inclusion of certain university locations (see chapter 2.5.2). Support for rural areas is particularly important in Somalia where telecom operators are currently not bound by licence conditions to minimum rollout requirements.

In rural and more developed areas alike, government participation in a PPP opens up opportunities for cost savings through synergies with other infrastructure development, such as road construction or improvement (see chapter 2.5.4). This is particularly promising in Somalia where a lot of road development will take place in the future.

In general, government-supported projects may attract favourable tax rates, grace periods, exemptions from import duties or licence fees, and preferential access to public land rights of way.

Government may also be able to add bargaining power in the procurement of equipment and services or the bulk purchase of bandwidth from international suppliers.

Last not least, the most valuable but also the most difficult contribution the government could make to a national backbone network PPP is security (see chapter 2.5.5) to protect network facilities along the fibre routes from damage or destruction. Security is the number one concern raised by the private sector, and the lack of it a key reason for the private sector's reluctance to pay taxes. However, it is a chicken-and-egg situation: Without revenue, government cannot even start to provide security and other services. Accountability and transparency of government finances must be improved to break this cycle.

5.1.4 Regulatory control

Depending on which private sector partners participate in the PPP (see chapter 5.1.2), different regulatory mechanisms would be required. Since a regulatory framework does not exist in Somalia and a regulatory authority has not yet been established, these mechanisms would have to be embedded in the PPP agreement ('regulation by contract', see chapter 5.2.6)

An issue with existing Somali telecom operators as PPP partners for the national backbone network would be that most of them also operate as retail service providers, so that a potential conflict of interest would arise from them becoming wholesale bandwidth providers through the PPP. Regulation would have to ensure that wholesale and retail operations are properly separated, to avoid anti-competitive behaviour towards other retail providers who are not PPP members. A fully transparent and non-discriminatory open-access pricing structure must be a key component in the PPP agreement.

On the other hand, a newly formed independent operator (domestic or international) for the national backbone network could be given a concession for wholesale services only and not be permitted to enter the retail sector. However, a regulatory authority would be required to monitor and enforce this.

5.1.5 Options for contracting out designated activities

Since the private sector operator partners in the PPP (whether they are existing Somali ones or an international operator coming in) would be expected to have the expertise and resources to carry out the functions required from them (see chapter 5.1.1), there should be no need on the private sector side for outsourcing major activities, apart from the usual sub-contracting of civil works and possibly customer service and support.

Given the weak institutional capacity in the public sector in Somalia, the government side of the PPP will have to source outside expertise, for example through the World Bank, to ensure the government's interests are sufficiently represented. The assistance may include:

- Drafting and negotiating the PPP agreement and other legal documents
- Technical support in reviewing network designs, costings and implementation plans
- Support in procurement and negotiations of bulk bandwidth purchases
- Implementation of e-government services using the new infrastructure

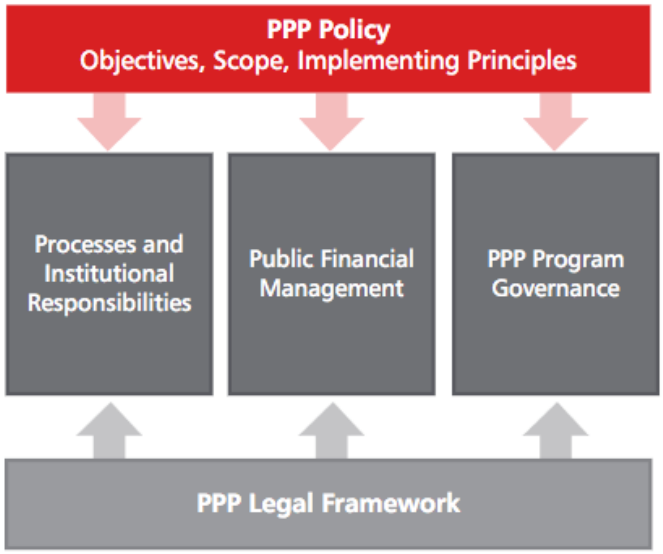
The PPP may also have to outsource security services to protect its network facilities.

5.2 PPP framework

There is no one 'model' for PPP that can provide definitive guidance across all environments. PPPs are highly contextualized based on a myriad of factors in the country including security and political stability, the legal landscape, the business culture, the government's fiscal position, industry capacity and strength, the needs of the public and consumers, and many others. Certainly, as illustrated in the above sections, Somalia faces unique challenges in each of these areas. Despite this, there remain some basic structure and common language that one should consider in determining how to move forward in establishing an appropriate PPP framework.

5.2.1 Framework overview

As shown in the figure to the right, most PPP frameworks will include a range of inputs from stakeholders on PPP policy – setting out objectives, scope and implementing principles for the project – that must be supported by a robust legal framework. The policy and legal framework inform and establish the central components of the PPP, namely processes and institutional responsibilities, public financial management, and PPP program governance.



Drawing from the World Bank's own report on PPPs, as well as publications of other institutions such as the African Development Bank[20] and the Asian Development Bank[21], we can define each of these central component in the figure for the Somali context as follows:

Policy: Articulation of the government's intent to use PPPs to deliver public good and services. In this case, the policy can be defined by an interest in delivering a robust domestic backbone infrastructure that will facilitate connectivity to a majority of Somalia's people and encourage competitive pricing of connectivity. The implementing principle is on a private sector led program that is supported as necessary by the government to encourage favorable financing and reduce political and financial risk.

Legal Framework: The legal framework underpins any PPP, and in this case, would provide a meaningful way for the government to reduce the country risk associated with Somalia. PPP-specific legislation may be one direction to go in establishing a unifying PPP oversight body within the government. Alternatively, regulatory or statutory authorizations for specific ministries to collaborate to establish a PPP on an *ad hoc* basis is a second possible course of action. "Regulation by contract," by including key rules and processes in the agreement among stakeholders (as discussed below), is another option.

Processes and Institutional Responsibilities: Certainly, the chances of success for PPP projects will be increased if the PPP process is efficient, transparent, and adhered to consistently. In Somalia, the rapid

[20] AfDB, Private Sector Development Strategy, 2013-2017, https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/2013-2017_-_Private_Sector_Development_Strategy.pdf

[21] Asian Development Bank, Public-Private Partnership Handbook, https://www.adb.org/sites/default/files/institutional-document/31484/public-private-partnership.pdf.

pace of governmental change that will be bought on by the upcoming general election will lead to some scepticism in the ability of the government to commit to a long-term project such as a PPP. In this case, the institutional framework needs to be even more robust and integrated so that it can endure the replacement of individuals at the ministerial level following elections. Beyond that, meaningful collaboration between the private and public sector will be vital to advancing the PPP beyond papers like this and into reality. Given the absence of legislation, and the likely reliance on regulation and contract to fill legislative gaps, any PPP process in Somalia will require increased transparency and the inclusion of additional institutional checks and balances to prevent overreach and even corruption by government and other stakeholders. International institutions and partners can facilitate these dialogues and processes, but it ultimately is up to the government and the private sector to take real measured steps in the interest of this project.

Public Financial Management: Given the fiscal imbalances in Somalia, it is unlikely that the public sector would be able to make a significant commitment to the PPP through direct financing. However, as tax structures continue to be negotiated for the industry and new regulatory statutes are implemented, favorable rates, grace periods, and other such mechanisms may be useful public sector tools. Additional creative solutions may be available such as favorable fees to securing public lands rights as well, so long as the public sector is guaranteed certain provisions such as open access, expanded networks to more rural areas, and the PPP is established as a wholesale connectivity provider. For the government's contributions, an ownership stake should be negotiated for additional government revenue, as well.

Good examples of private sector incentives are those offered by the government of Vietnam for investment in infrastructure through PPP. There, certain PPPs enjoy a corporate income tax exemption for four years and reduced rates for up to fifteen years. The project enterprise and the subcontractors are entitled to duty exemptions. Certain project intellectual property is exempt from taxes relating to technology transfer and royalty income. Some of these same tax incentives are applied to projects that are external to the PPP and are implemented by the investor so that the investor can recover the capital invested in these PPP projects. The project enterprise is also exempted from land use levy or rental for the project's lifespan.

Broader Arrangements: It is important to consider how to emphasize the role of more external entities in the PPP process – such as auditors, the legislature, and even the public directly – so that PPP implementers will be accountable for their decisions and actions. This will be extremely important in Somalia where the legal landscape and judicial system currently fail to provide some of the most basic protections for investors and against corruption, and where increased government involvement in the sector is viewed suspiciously by the private sector, thus dis-incentivizing PPP.

A word of caution: given the lack of detail in the law and the myriad of risks, it may be tempting to create a complicated arrangement to hedge against uncertainties. World Bank experience seems to indicate, however, that most PPPs developed through its projects fail because they are overly complex. A lesson is that simplicity is one of the most important, if not the most important, qualities a PPP can have. This will be important to keep in mind as financing and other aspects of the PPP are put in place.

5.2.2 PPP financing options generally

Recent experience across the World Bank indicates clearly that there is no cookie-cutter PPP financing method that will be applicable to all sectors within all countries. Despite the range of options when considering a PPP solution, a few key elements remain present. (Gallegos, 2012)

Commercial Joint Venture: This PPP structure is centered on investor participants (both international and national, and from both inside and outside the sector) that establish a for-profit commercial enterprise as a unique entity for the provision of wholesale connectivity services and in limited cases retail capacity. This structure is highly dependent on investors willing to assume the risk of participation. In as much as operators will still have non-discriminatory access to wholesale services without taking on the early-stage risk of investment, there is a natural disincentive to participate. On the other hand, this sort of venture may attract investors who are non-sectorial – in other words, people with no affiliation to ICT may invest for other financial reasons. While the role of direct public sector involvement is potentially low, a high degree of regulatory oversight is nonetheless required to monitor the fair-practices of the governing body of the enterprise e.g., maintaining non-discriminatory practices of wholesale pricing scheme as controlling interests may vary over time.

Cooperative: A cooperative approach is one in which capacity rights are determined by investment in a Special Purpose Vehicle (SPV), a legal entity created by the sponsor or originator to fulfill a temporary objective. Here, the SPV would likely build, own, and operate the national backbone. Wholesaling in this model is not a profit driven process, and as such, market competition is pushed to the access network providers. Investors would be free to divest or invest further as appropriate for their purposes, and capacity costs (through ownership stake) are therefore market driven. Government participation could come in a variety of forms including subsidies or retention of a stake in the SPV as needed for the viability of the PPP (akin to an equity PPP model). While public sector participation will serve to reduce the costs of developing the infrastructure, the fact that the SPV is not inherently profit-seeking serves to remove participation incentives from non-sectorial investors. Strong collaborative efforts are needed within the SPV to ensure the success of this model.

Advance Purchase Model: With this model, the government establishes a competitive tender for the long-term supply of broadband for government use. The chosen private sector company acts as a wholesaler in the market, and must offer the government price to other users. This approach has the benefit of being private sector led, with the winning company contributing its own investment finance in exchange for the long-term revenues guaranteed through the supply contract. There are, however, potential downsides to this approach. As the contract is long-term, the bid winner may end up with an unfair competitive advantage and prices may be locked in over time rather than subject to market forces.

Concession: This approach utilizes a public tender to contract a firm to build and operate the backbone for a predetermined period of time during which the operator would have, within defined regulatory limits, monopolistic control of the network. The length of the concession would likely be for greater than fifteen years at which point the network is transferred back to government control. The advantage is the minimal amount of government resources needed as well as not requiring inter-operator agreements. This requires careful selection of the single operator, and as with the commercial joint venture, this requires a strong regulator.

Management Contract: Similar in nature to a concession with two key differences: first, the role of the selected private entity is to build, operate, and ultimately commercialize a national backbone for a fee, and second, the term length is typically much shorter (three to five years). As with the concession, principal assets are and remain property of the government.

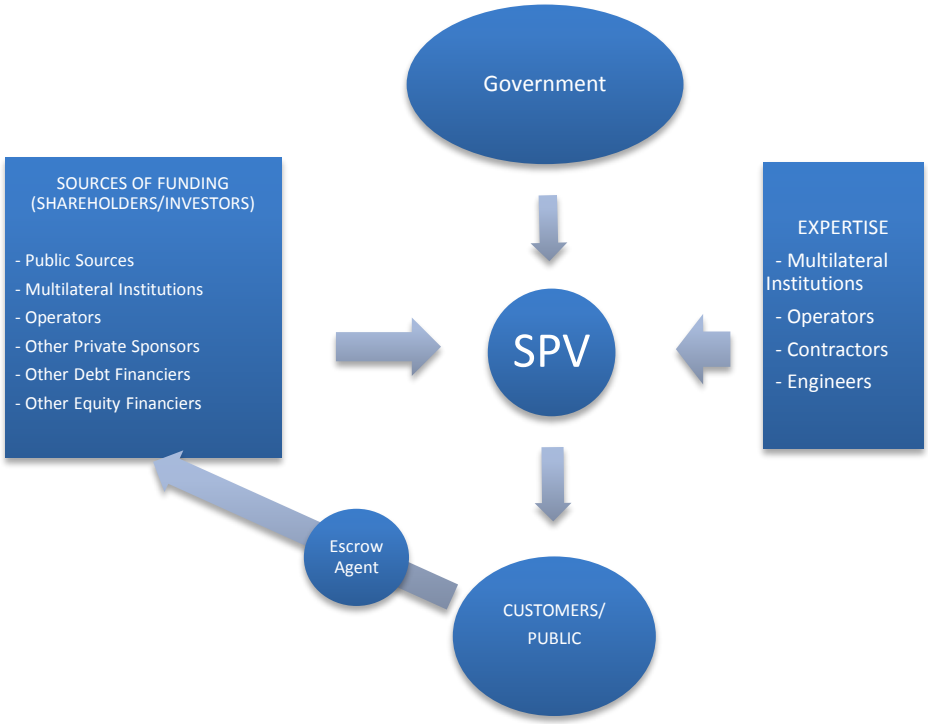
5.2.3 Suggested framework and financing for Somalia's national backbone network: SPV option

Given the lack of government funds in Somalia and the need for government participation, the reality that financial resources and expertise will be required from multilateral organizations (such as the

World Bank), the lack of a strong regulator, the need for the operators to be involved and to mitigate their risks, and the likely difficulty in attracting sufficient investment to rely solely on commercial interest, some mix between a commercial joint venture and cooperative SPV may be favored.

The SPV would protect the sponsor or parent entity (here, the Somali government) by disaggregating such risks as cost overruns and delays across a multitude of stakeholders. The SPV would also provide operators a formal organisational structure to share the costs, risks and ownership of an asset that they all need and where it makes no sense to duplicate the asset for each provider. Such SPVs are typically established so that the government shares will be divested at a later date to the operators. Sharing costs in this way is particularly useful in poorer environments, such as Somalia, where international fiber-optic connectivity would likely not be feasible without the involvement of and subsidies from government and multilateral organizations.

In simple terms, the SPV would borrow the required funds from debtors, grantors or shareholders, which can be public or private entities, multilateral institutions, or debt or equity financiers. Debt or returns on equity are paid back using the cash flow generated from the project. This cash flow is normally paid to an escrow agent, and thus ring-fenced in order to prioritize payments to debtors and investors. These relationships are represented in the graphic immediately below.



Governments have set up SPVs, with operators and multilateral organizations as investors, to finance the fibre optic backbone in such places as Benin, Gambia, Liberia, Sao Tome Principe and Sierra Leone. A particularly good example comes Gambia's efforts to attract its first submarine cable. In 2008, the Gambian government entered discussions to join the Africa Coast to Europe (ACE) submarine cable, an Orange Group initiative to connect Europe to the west coast of Africa. The government set up a SPV that later received a World Bank loan for US$25 million to fund its investment in the ACE cable and include a Gambian landing station. The plan called for divesting part of the shareholding of the vehicle to the private sector on favourable terms as an incentive for participation in the PPP. This occurred in 2012, with a total of 51% divested to Gambian ISPs. As further incentive, Gambia has not charged a fee to the SPV for the licence to operate a submarine cable landing station and has

informally indicated that it is likely to not charge for any subsequent cable landings. The cable began service in December 2012.

SPVs for ICT infrastructure with "open access" can have a positive effect on competition where rules are drafted so that access is available to all operators. Such arrangements provide smaller operators access to infrastructure that they could not afford on their own, and put a neutral body (the governance structure of the SPV) in charge of the asset. Without the SPV, smaller operators would be at the whim of larger operators that would be more likely to own such assets, and, as such, would likely be forced to purchase bandwidth as second or third tier providers at higher rates.

The formal structure of the SPV can vary, depending on the rules of the jurisdiction in which it is incorporated. For example, in Canada, SPVs are formed as charitable trusts; in the United States, they are typically limited liability corporations; and in the UK, they are often organized as limited purpose corporations with a charitable trust as the owner.

SPVs for ICT infrastructure with "open access" can have a positive effect on competition where rules are drafted so that access is available to all operators. Such arrangements provide smaller operators access to infrastructure that they could not afford on their own, and put a neutral body (the governance structure of the SPV) in charge of the asset. Without the SPV, smaller operators would be at the whim of larger operators that would be more likely to own such assets, and, as such, would likely be forced to purchase bandwidth as second or third tier providers at higher rates.

Because of the effects such SPVs can have on markets, SPVs must be licensed and regulated, and rules governing the SPVs must encourage competitive practices. An example of guidelines for SPVs in this context is that created by the West African Telecommunications Regulatory Assembly (www.watra.org).

5.2.4 Suggested framework and financing for Somalia's national backbone network: Advance purchase option

As mentioned above, with this model, the government establishes a competitive tender for the long-term supply of broadband for government use. The chosen company finances the project in exchange for these long-term revenues and offers the government price to other users.

This approach was used recently in Malawi in a project assisted by the World Bank. There, a private company, SIMBAnet, built new fibre optic capacity into the country from Tanzania in order to meet the requirements of the tender. The World Bank provided financing of $20 million. A similar approach was used in Rwanda as well.

This option is worth strong consideration in Somalia. Malawi and Somalia face similar challenges in terms of economic development and government capacity. And, the structure with this option is relatively simple, as it was not necessary to establish any complex financing vehicles, such as an SPV.[22]

[22] Personal communications with World Bank staff.

5.2.5 Constraints on the formation of the SPV

Below are the constraints that face the formation of the SPV:

- There is no existing framework to govern the formation of an SPV structure in Somalia
- Lack of experience in SPV formation and participation in PPP mechanisms in the government and the private sector
- Lack of awareness among major operators in understanding the benefits of participating in PPP structures and the formation of SPVs
- Lack of incentive for larger operators to participate in SPVs that could broaden access to smaller entities
- Weak enforcement of laws and regulations. In the past, some operators have reached agreements in interconnectivity and those arrangements proved unsuccessful due to lack of effective enforcement or arbitration mechanisms on the part of the government.

5.2.6 Legal framework

Establishing a robust legal framework is critical to the long-term success of the project. Drafting and granting a PPP contract normally requires reference to and depends upon other laws, such as procurement laws, public financial management laws, sector-specific laws and regulatory frameworks, environmental laws, land acquisition laws, and licensing requirements. In Somalia, as discussed in Section 2.3.1 above, the legal framework is certainly lacking.

Specifically, Somalia's legal and regulatory framework does not yet specifically provide for a PPP mechanism, and does not yet have in place a regulator and licensing regime for its ICT sector. Given this lack of legal certainty, determining the ability of current Somali institutions to fulfil the role of a dedicated PPP unit on an ad hoc basis requires consideration of the commercial pressures and potential for corruption that are likely to come into play, as well as the ability of those Somali institutions to monitor and enforce compliance effectively. In the Somali context, the PPP mechanism charged with oversight will have to be designed to manage commercial operators that have dominated an environment free of government, let alone government regulation, and in which the judicial system provides few, if any, real protections for property and contractual rights.

Additionally, if an SPV is required, that will have regulatory implications. Because of the effects such SPVs can have on markets, they are normally licensed and regulated, with rules to encourage competitive practices. An example of guidelines for SPVs in this context is that created by the West African Telecommunications Regulatory Assembly (www.watra.org).

As also discussed in Section 2.3.1 above, Somalia also lacks almost all of the other legislation normally in place to support PPP projects, and its legal institutions do not yet function effectively. This situation is unfortunately common in developing countries, particularly those in conflict. As a stopgap measure, Somalia could put in place regulatory or statutory authorizations allowing specific ministries to collaborate to establish a PPP on an ad hoc, project-by-project basis. A system for oversight would need to be put in place, perhaps from somewhere else in government to provide adequate checks and balances. Alternatively, these deficiencies in legislation, regulation and judicial enforcement could be addressed through "regulation by contract', meaning that the agreement entered into by all stakeholders for the specific PPP project would include provisions normally found in legislation, and performance would be enforced through incentive systems and alternative dispute resolution mechanisms outside Somali courts. There would need to be a transparent and publicly available agreement that provides the elements missing from the legal framework (discussed generally above) and includes the following specific issues, among others:

- Allocation of risks allocation and responsibilities, including in the event of 'acts of God,' or other unforeseen events.
- Renegotiation provisions that can be triggered based on events or every ten to fifteen years.
- Mechanisms for monitoring and evaluation, including key milestones.
- Investment and infrastructure access tied to performance in order to incentivize compliance.
- Dispute resolution mechanisms that are robust and involve external rules and dispute resolution institutions.
- Placement of oversight authority and enforcement powers with a cross-governmental ministry with the power of the purse, i.e., the Ministry of Finance. For these functions (and other oversight functions discussed in this section), potential roles for a Chamber of Commerce and a Somali Investment Agency could be explored.
- A system for provisionally granting any necessary licenses or other approvals that would normally be part of other legislation (including communications legislation, given that the Somalia National Communications Act is not yet passed.)
- Other areas where governments normally incur financial liability, such as environmental and eminent domain issues.

5.2.7 Cross-sector joint programs

Elsewhere, ICT infrastructure build-out is combined with other infrastructure projects, such as highway construction or energy infrastructure developement, in order to save on costs and take advantage of other synergies. As significant portions of the costs of deploying fiber are incurred in excavation and securing right of way, combining fiber and highway projects allows cost sharing and reduces total expenditure.

In recognition of this, United States presidential order from 2012 designed to accelerate broadband development touted a "dig once" policy encouraging the deployment of fiber during road construction projects. Similarly, several North African countries (including Morocco and Tunisia) have incorporated ICT infrastructure into construction on railway networks. In Spain, such cross-sector developed is mandated by law. There, legislation requires design and construction of new buildings to include common passive communications infrastructure such as access points and ducting, and building managers are requires to allow access to any operator wishing to provide fiber-optic networks in surrounding areas. Likewise in Somalia, legislation (or other forms of legal obligation) could require, and government policy could encourage, ICT infrastructure and access in connection with other non-ICT infrastructure development.

6 Recommendations

6.1 Feedback and recommendations received from stakeholders

Federal Ministry

1. The Federal Government should be provided with technical resources to train key staff on PPP options and the way forward. As such, its institutions, including Federal Parliament and leaders in key ministries should develop a common vision for the sector agreed upon among various stakeholders.
2. There should also be direct lobbying directed at senior leadership in both federal and regional states regarding the benefits of PPP options and the best way to introduce them to Somalia. This could be done by a World Bank mission to Somalia and one-on-one meetings.
3. Resources sharing is a highly contested issue in the country now. Establishment of a forum for dialogue among federal and regional authorities on how to best share revenues from the ICT sector is important. Federal Parliament is tasked to offer solutions in this area. Working within the Federal Parliament to begin this process is probably the best way forward.

Federal Member States

1. Any initiative that increases collaboration with the Federal Ministry is welcome. Establishing a standing committee on PPP options will create an enabling environment to move forward on some of the key recommendations.
2. Harmonising fees across the country and the various administrative areas is required.

Somaliland MPT and ICT Commission

1. As an administration, Somaliland has the best opportunity to benefit from training. The next phase of the project should have a major training component for both MPT and the newly formed ICT Commission.
2. Potential training should also include a component that provides best practices on infrastructure development (developing more robust revenue generation from the sector, Rights of Way management, mutualisation of infrastructure etc).

Major Operators

1. Telecom operators have carved up geographical markets already. This provides an opportunity to take advantage of partnerships with international investors. Given the recent passage of the Investment Law in the Federal Parliament, and arrival of international submarine cable connections to the Internet are two important factors driving further investment.
2. As the private sector investment process moves ahead, increased public sector involvement and international investors are paramount. In fact, major telecom operators are seeking out partners from the East Africa region and beyond.

6.2 Recommended next steps for determining appropriate PPP framework and financing

The analysis in this report has emphasized the need for stakeholder participation, transparency and proper understanding of the risks (legal, political and otherwise) of the Somali environment. The recommendations here aim to outline, in a relatively simple and straightforward way, concrete steps

that the government can take in concert with donors and other stakeholders in order to make this PPP project a reality. Each of the steps would necessarily involve face-to-face meetings and workshops and should be tied to a clear and detailed schedule of milestones. Each of these recommendations draws upon more detailed explanations above.

1. *Make clear that the PPP should be led by the private sector*. The government should emphasize the importance of private sector initiative throughout the PPP project, including in financing it. Potential for such financing could very likely include pre-purchase of the increased bandwidth, as discussed above. It should be made clear that public financing will only be employed to the extent necessary to reach areas where private sector interest is not sufficient to provide connectivity without additional intervention or incentives.

2. *Convene potential stakeholders to determine likely levels of financial support.* Government, operators and international experts should be brought together with potential sources of financing, including potential multilateral donors, operators and other contributors, to gauge whether PPP is likely to attract the necessary levels of financial support.

3. *Determine likelihood of involvement of multilateral organizations (such as the World Bank), as expertise and resources from such organizations will be required.* Given the lack of financial resources and technical capacity on this issue in Somalia, financial support and expertise will be required from multilateral organizations and other international donors to establish a framework for structuring and financing a PPP of this scope in Somalia. This support could be provided in phases in order to establish milestones for success and to facilitate management of funding streams. Initial commitments of support will need to be gauged as a starting point. Combining these ICT efforts with other infrastructure build-out, such as road construction, should be explored. Then, such organizations will have to undergo internal funding and external procurement processes in order to put such support into place. They will require a clear commitment from the Somali government to the PPP process before doing so.

4. *Put expertise in place to drive the process.* Elsewhere in similar contexts, such expertise is brought on board by hiring outside consultants can be secondments from international organisations (such as the World Bank) or the private sector. These experts can be international or local, and likely should be a combination of both, where international experts with experience with PPP elsewhere work with local experts with superior knowledge of the Somali context. The ultimate goal should be knowledge transfer to and capacity building of local expertise. Such experts are often funded by international donors or multi-lateral organizations.

5. *Identify where in the government PPP expertise should be placed.* Governments commonly develop dedicated PPP units to work potentially across multiple and varied PPP projects, providing procurement, planning and technical support, as well as monitoring project performance and generally promoting PPP across sectors. In the Somali context, such PPP oversight authority and enforcement powers could best be placed with a cross-governmental ministry with the power of the purse, *i.e.*, the Ministry of Finance. A Chamber of Commerce and a Somali Investment Agency could also be tasked with authority.

6. *Develop a business and financial plan.* The international experts should work with the government authority charged with this PPP project to develop a plan outlining

investment needs, milestones and risks, as well as costs and benefits to the sector, consumers and the national economy. Participation by stakeholders should be defined. A determination should be made of which operators (existing and/or new) should be involved.

7. *Conduct a review of the Somali legal landscape to determine what relevant legislation exists or is missing*. As discussed in greater detail above, Somalia's legal and regulatory framework does not yet specifically provide for a PPP mechanism, and does not yet have in place a regulator and licensing regime for its ICT sector. Somalia also lacks almost all of the other legislation normally in place (discussed and listed above) to support PPP projects, and its legal institutions do not yet function effectively. Although this section above provides a brief summary of existing legislation and gaps in the legal framework, a more comprehensive review of the legal landscape should be conducted by Somali lawyers (and such capacity likely exists in the government) to detail other more tangential existing and needed legislation. This review should identify where "regulation by contract" (meaning that the agreement entered into by all stakeholders for the specific PPP project would include provisions normally found in legislation, and performance would be enforced through incentive systems and alternative dispute resolution mechanisms outside Somali courts) might be possible to address such legislative gaps. Given the dearth of existing relevant Somali legislation, such a review is not likely to take a considerable amount of time.

8. *Establish any key legislative goals and priorities for the PPP agreement.* Once an interested group of stakeholders is established, work collectively to determine legislative possibilities and priorities and draft the outline for a PPP agreement to address such gaps.

9. *Put any necessary laws and rules into place.* Enact any PPP- or any SPV- specific legislation, regulations, rules or licensing requirements required and/or possible within agreed timeframes.

10. *Establish* investment structure (including any *SPV) and draft the PPP agreement.* All of the steps above should ultimately culminate in an organizational and financial structure (as discussed in more detail in this section above), and a corresponding PPP agreement, that properly establish the relative rights and responsibilities of all stakeholders. In the Somali context (as is also discussed in more detail in this section above), this PPP agreement will be instrumental in filling gaps in the legal and regulatory framework.