NATIONAL BROADBAND NETWORK (NBN) POLICIES

A COMPARATIVE STUDY LEADING TO RECOMMENDATIONS FOR THE MENA REGION

An independent report for the FTTH Council MENA by Ventura Team LLP

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FORWARD AND INTRODUCTION BY FTTH COUNCIL MENA

The concept of a national broadband network (NBN) has been developed by governments around the world who are continuously examining the status of their infrastructure, assessing the sector and deciding whether existing networks need to be modernised or extended. This process of examination has given rise to the concept of an open fibre broadband network stimulated by government.

As part of its Regulatory and Policy Committee's mission, the FTTH Council MENA is committed to strengthening its cooperation with policy makers, governments and regulators in the region in order to positively influence relevant NBN policy development and have a positive impact on broadband deployment in general, and FTTH rollout in particular.

The FTTH Council MENA commissioned this report from Ventura Team to survey the current status of NBN policies in the MENA region in order to identify the most effective generic approach to help policy makers, governments and regulators make the right decisions in the matter of NBN policy and accelerate the FTTH deployment.

This report includes information, updates and generic recommendations that reflect the views and experience of the expert consultants. The best practice will clearly vary depending on the local circumstances in each country. This report is specifically tailored to NBN/FTTH deployment policy and structured in several sections representing the findings of the study and leading to several suggestions and recommendations:

- Study and analysis of the actual status of NBN/FTTH in 16 countries of the MENA region
- Observations regarding MENA approaches to NBN
- Identification of 9 key dimensions for NBN policy
- Comparison of the MENA status vs. the 9 dimensions
- Suggestions/recommendations on each of the 9 key dimensions

The Executive Summary briefly describes the key findings before getting into the full details of each section. It is recommended to use the summary for a quick overview and for public communication.

We believe it is worth to focus on the execution of NBN plans in each country due to the general circumstances in the region that are rapidly changing from business and political perspectives. This will help the acceleration of FTTH deployment in the MENA region.

EXECUTIVE SUMMARY

MENA NBN Status

In the body of the report we survey the status of NBN or related national policy across the region. Approaches vary greatly which is to be expected given the immense diversity in terms of infrastructure, political situation and economic development across MENA.

Formative	Emerging	Implementation	Achieved
Discussions about NBN policy are at an early stage without yet a conclusion or have stalled.	Desire for ubiquitous high-speed broadband and policy is developing in parallel with initial deployment.	The general strategy is mature and the focus is now on implementation.	The NBN goal of ubiquitous high-speed broadband has been achieved.
Egypt	Jordan Iran Iraq	Bahrain Oman	Qatar
No Policy (Market Lead) or Informal			
Either there a) is **an informal NBN policy** directing State controlled operators to invest **or b) has not yet been a serious discussion** about NBN policy**, or c) the decision is to rely entirely on market activity.**			
Libya Palestine	Kuwait Tunisia Lebanon Algeria Morocco	Saudi Arabia	UAE

Table 1 National Broadband Initiatives - Status in autumn 2018 (green arrows show progress from 2017)

Pragmatism v Idealism

In this report, we recommend the ideal position on each of nine key dimensions of any NBN policy. Clearly, these are our generic recommendations and the best policy in any specific country will vary depending on local circumstances. Nonetheless, we believe that moving as far as possible towards our generic idea on each dimension will bring benefits to any NBN programme.

We recognise that some of the recommendations here may seem rather idealistic. Some may appear unnecessary or overly ambitious and for others - where the situation locally may be very unstable - they may simply be unattainable. We accept and fully agree that achieving some practical progress in the real world is infinitely preferable to prolonged delay in pursuit of an unachievable ideal. These recommendations and the logic supporting them are designed to help policy makers and others involved in NBN. They should at least foster debate. The merit of each recommendation should be tested for your own situation and adapted accordingly.

Recommendations

We identified nine key dimensions of an NBN policy and for each we recommend a position on the spectrum of possible measures. These are summarised in the table below.

Policy Dimension	Essence of Recommendation
Geography: Competitive v Complementary	Complementary is more efficient
Copper Switch Off / Incumbent Migration	Should be guaranteed
Consistency of Regulation with NBN (esp. pricing)	Aim for high consistency but need not be perfect
Execute via Incumbent or New NBN Organisation(s)	New focussed organisation preferable
Single v Multiple NBN Companies	Multiple companies to reduce execution risk
Clear, accountable, stable Governance of NBN	Essential for any endeavour
Degree of Structural Separation	High degree of separation likely more effective
Government v Private Finance	Signifiant private finance adds discipline
USO or other Ongoing Contractual Revenues	Universal service should be modernised to fit NBN

Finally, we compared the average of MENA practice to our recommended positions. The result of this comparison is shown by the chart below.

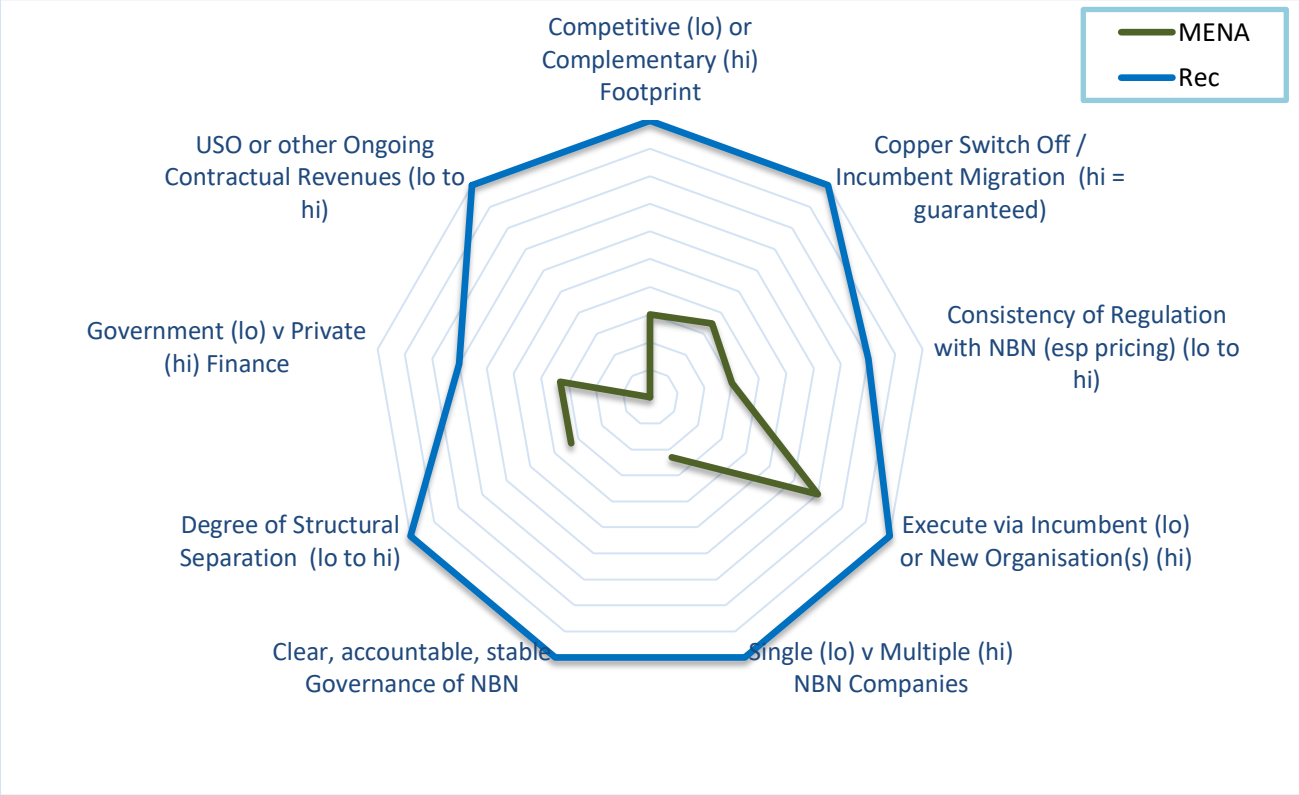

Figure 5 Comparison of the average MENA policy with our recommendations on the nine key dimensions

As is clear from the diagram, we feel that the general practice of NBN policy in the region could be improved, although it is not the case that in any specific country the optimal policy should or could match our ideal on each of all the nine dimensions.

CONTENTS

GLOSSARY

FTTH	Fibre to the Home. An access network utilising only optical fibre to connect the home (or other type of premise).
FTTP	Fibre to the Premise – a more generic and in some ways for NBN more correct term than FTTH.
Incumbent	The long established national fixed telephone company. Depending on the country, this organisation may still have a monopoly or protected position.
ISP	Internet Service Provider. A company that connects a customer over the NBN to the global Internet.
MENA	Middle East and North Africa.
NBN	National Broadband Network: a ubiquitous (or at least very extensive) open (fibre) broadband network stimulated by government.
NBNCo(s)	Abbreviation for NBN Company (or companies) – the organisation(s) responsible for delivering and operating the NBN itself.
PPP	Public Private Partnership: a financing structure for social / public service oriented projects. See section 2.3.8.
UAE	United Arab Emirates.
USF	Universal Service Fund: a funding mechanism to make good one or more operators that bear the cost of serving uneconomic areas or customers under the USO.
USO	Universal Service Obligation: an obligation placed on one or more telecom operators (or indeed the NBN) to provide service everywhere in a national territory including to uneconomic areas and perhaps also uneconomic types of customer (i.e. those that spend very little but need access in case of emergency).

1 WHY NBNS?

It has become increasingly clear in recent years that the provision of telecommunications, and in particular broadband, is essential for economic growth and prosperity. Governments around the world are examining the status of their infrastructure, assessing the limitations of private sector coverage and deciding whether existing access networks need to be modernised / extended.

1.1 Definition of an NBN

This process of evaluation of infrastructure fitness for purpose has – in cases where infrastructure is deemed inadequate, incomplete or needs Government action to modernise or extend - given rise to the concept of **a national broadband network (NBN) which is a ubiquitous (or at least very extensive) open (fibre) broadband network stimulated by government**. At its heart, an NBN is an economic development and social initiative but many are designed to provide infrastructure in profitable areas so that they may internally cross-subsidise the uneconomic areas of a country.

Not all countries need an NBN of course - existing networks or the private sector's rate of investment might be perfectly adequate. Usually the goal for an NBN is to eventually provide ubiquitous coverage. In some cases, perhaps 100% coverage is too problematic; New Zealand for example has a target of 75% of premises by 2020 after which it is unclear if the NBN will be extended.

1.2 Fibre is the Most Common Choice of Infrastructure Type

Where they are initiated, an NBN does not necessarily mean only a FTTH infrastructure but could also rely on wireless systems in low density areas (LTE, Wi-Fi, satellite). In general, however most NBN investment is dedicated to fibre as this is the only technology that is future proof and provides the high speeds increasingly needed by businesses, consumers and the public sector.

1.3 Early Examples of NBNs

Approaches to NBN very greatly around the world. The earliest widely recognised proponents were Australia and Singapore. In both cases a frustration with the lack of investment by private operators and the incumbent led to the government driving construction of a new replacement network:

- In Australia, this took form of a state-sponsored corporation that would progressively take over certain access network assets of the incumbent and invest in fibre access (as well as wireless systems in low-density areas).
- In Singapore, the government used its influence and part ownership of the incumbent to cause an industrial consortium to be established to provide an open network: open and separated at both the physical level and the wholesale service active layer.

Of these two early examples, Singapore is the most successful although as it is a densely populated city state rather than a sparsely populated continent it is an unfair comparison. However, there is not only geography at play in determining success. In Australia, the hugely complicated and politically controversial project faced may hurdles and made only very slow progress until recently.

2 Overview of MENA Region Developments

The MENA region is very disparate economically ranging from the abundant wealth of the Gulf, through emerging economies to the extremely difficult situation facing conflict zones. In terms of broadband infrastructure, at one end of the spectrum the UAE is now all fibre whereas at the other in some countries there are still significant areas without any (or only basic) service.

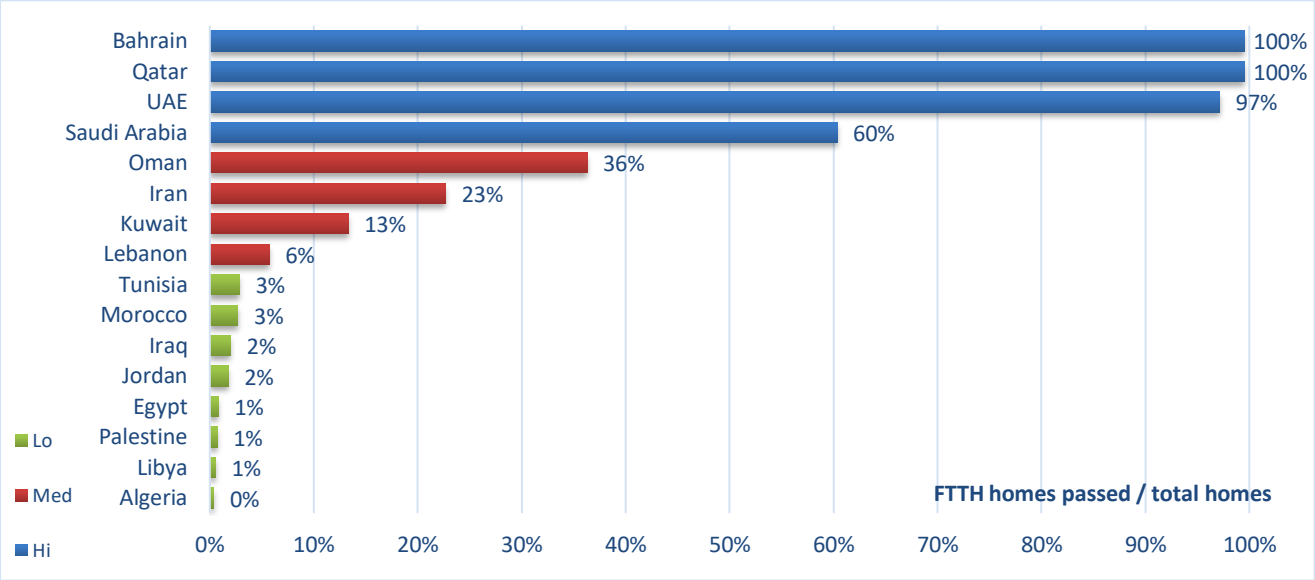

Figure 1 November 2017 FTTH Coverage in the MENA Region (Derived from the IDATE Panorama produced for the FTTH Council MENA)

2.1 Stages in NBN Policy Development and Implementation

Unsurprisingly NBN policies also vary widely ranging from the formative stage to the already complete as shown in the table below. This table uses green arrows to indicate progress 2016>2017.

Formative	Emerging	Implementation	Achieved
Discussions about NBN policy are at an early stage without yet a conclusion or have stalled.	Desire for ubiquitous high-speed broadband and policy is developing in parallel with initial deployment.	The general strategy is mature and the focus is now on implementation.	The NBN goal of ubiquitous high-speed broadband has been achieved.
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Table 1 National Broadband Initiatives - Status in autumn 2016 (green arrows show changes from 2015)

2.2 Individual Country "Status Updates"

Below we provide a short "status update" of NBN policy discussions in each country. These have been compiled from a combination of published sources (press reports, Ministry and regulator websites) and interviews with various industry contacts. The updates reflect our best understanding but have not necessarily been verified with the relevant national Authorities.

Algeria

Algeria's NBN-related initiative focuses on the State owned incumbent Algerie Telecom, which in Jan 2018 announced the commercial launch of FTTH broadband in several regions. The ground was laid for this in previous years by first extending the national fibre backbone to reach any settlement of more than one thousand population. *The Plan National de la Fibre Optique* (PNFO) was defined in 2012 and resulted in the establishment in July 2013 of a joint venture between the incumbent and three national utilities called CITA (Compagnie des Infrastructures de Télécommunications d'Algérie) to pool backbone fibre assets.

In 2015 the government granted a loan to Algerie Telecom of 115 billion DZD (~ 0.957 billion EUR) to deploy fibre in urban areas. An additional loan of 140 billion DZD (~ 1.166 billion EUR) was announced to extend the network in rural areas.

Regarding policy, in 2014 there was discussion of opening the market but in 2017 Government announced backing for monopoly would remain and that the incumbent has a plan to connect one million premises to fibre. As a complementary measure the recent Code of Posts and Electronic Communications includes an obligation for Algerie Telecom to unbundle (copper?) local loops to be used by alternative operators.

Bahrain

In 2016 NTP4 (the fourth such plan to be issued under the National Telecom Plan – NTP) was issued and set out Government's strategic plan and general policy for the telecommunications sector of the Kingdom of Bahrain, covering the three-year period starting from 8 May 2016. A core objective set by TRA in this direction is the development of optical- fiber based National Broadband Network (NBN) capable of delivering ultra-fast broadband to consumers and businesses across the Kingdom; a key development underpinning all of the policies established by NTP4. The Government's policy as stated in NTP4 requires, amongst other things, a structural reform of the telecommunications sector in Bahrain that includes the functional separation of the incumbent telecommunications operator, Batelco, and the formation of a new legal entity, as well as the deployment of a National Broadband Network ("NBN"). The new functionally and legally separated entity will be required to deploy the NBN and supply NBN based wholesale products and services (including "bitstream fibre") to all licensed operators in a neutral manner.

A significant step was taken in 2017 when the TRA ordered Batelco to (structurally?) separate its infrastructure division (in charge of fibre deployment) from Batelco's

operations, in order to provide infrastructure open access. This process should be completed in September 2018.

In terms of services, the NBN should deliver by May 2019 as a minimum:

- For residential customers: ultra-fast broadband access enabling downstream data rates of a minimum 100 Mbit/s for 95% of households; and
- For business customers and mobile basestations: ultra-fast broadband access enabling symmetric and uncontended data rates of minimum 1 Gbit/s, with 100% coverage.

NTP4 is the latest evolution of policy and implementation since 2010 when the Government took the decision to "*make available on an open access basis, on fair and reasonable prices, capacity on the fibre-optic network of the Electricity and Water Authority (EWA) utilising those fibres that are in excess of (its) direct needs*". There was also around this time discussion of either the TRA or other Government agencies funding at least part of a fibre NBN project.

Egypt

Growth in fibre is very slow mainly now reliant on Telecom Egypt which is increasing investment. Telecom Egypt has 18,000 km of fibre deployed in the access network apparently enabling 52% of all households as of end of 2017 and TE plans to reach 72% by end of 2018.

Egypt has long had a vibrant ISP sector, in part bolstered by many local (sometimes illegal) networks. In 2012 it was reported that general political developments delayed the 10-year $2.4 billion national broadband plan announced by Government the year before. That Plan was to be 20% funded by Government to stimulate private investment with the aim of providing a minimum of 2Mbps broadband available to all by 2015 and then by 2021, 25Mbps available to 75% and 4G mobile broadband to 90% of the population.

In May 2014, the telecom Minister announced two projects totalling EGP 75 billion of investment to increase the availability of high-speed broadband 2017-2020 although we have not been able to obtain details. In 2016 Telecom Egypt reported prior year growth in broadband revenues of almost 40% and 45% in 2017.

Iran

In 2012 the Government licensed *Iranian Net* as a new national operator for FTTH with a 25-year concession (which we believe was originally exclusive) in a policy seemingly modelled on Qatar. In June 2015, Iranian Net announced that it would deploy 500,000 FTTH ports in seven major cities during the rest of 2015. Press commentary suggests that persistent financing problems severely limited actual deployment.

In January 2017 the Iranian government publicised a new series of reform targets for the telecoms sector under its latest five-year plan for 2016-2021 and launched a nationwide plan to connect Iran with fibre. This project started in Tehran and 8 main cities in the country. The plan is to deploy 12,000 km of fibre optic cables nationwide,

in order to provide 20Mbps broadband connections to main cities. In May 2017 it was reported that the Telecommunication Company of Iran (TCI) launched a project to deploy the country's first fibre-to-the-home (FTTH) connections in Tehran and seven other cities. Citing TechRasa, it seems that the initial phase of the rollout will see 580,000 lines installed, including 245,000 in Tehran, 85,000 in Isfahan, 80,000 in Mashhad, 61,000 in Shiraz, 61,000 in Ahvaz, 28,000 in Karaj and 20,000 in Kermanshah. Fibre-to-the-cabinet (FTTC) technology has previously been used by another state-backed operator, Iranian Net, but TCI's new TANOMA project will mark the first time that fibre connections have been installed directly to the customer premise. Iranianet was partly reliant on investment by South African operator MTN but in July 2018 press reports suggested that deal was off. Meanwhile TCI announced FTTH investment for the year of USS$900m and opened up its network to more ISPs.

Iraq

Due to the security situation, the policy focus was on mobile until 2017 when the Ministry of Communication launched a National FTTH rollout project. Build, Operate and Maintain (BOM) contracts have been signed with two Iraqi companies to deliver almost 200,000 premises passed.

In 2018 the Government owned operator State Company for Internet Services (SCIS) completed deployment of 150,000 homes passed in five areas of Baghdad. The project was 100% funded by a loan from Japan and was completed on schedule, despite difficult circumstances according to the Ministry of communications. A private ISP will now run the commercial exploitation of the network – a form of public-private cooperation in the spirit of our recommendations (re new organisation).

Jordan

Jordan first developed an NBN initiative in 2003 but chronic lack of funds has meant numerous setbacks. In Spring 2014 the National Broadband Network (NBN) seemed set to re-start after receiving $209 million in funding from the Gulf Cooperation Council.

The network envisioned for the National Broad Band Network owned by the Ministry of Information and Communication Technology (MoICT) is an optical fibre network which is scalable, affordable, simple to manage, reliable. The objective of the National Broadband Network (NBN) is to connect all Public schools, Governmental entities, Health entities, Community colleges, and Knowledge stations). The network uses point-to-point Gigabit Ethernet (GE) over fiber.

By February 2017 the National Broadband Network was 25% deployed and reached 968 sites and aimed to add a further 917 sites in the south and centre of the country through 1720 km of fibre.

In April 2017 the Regulator announced the intention to centralize all existing infrastructure information in order to encourage infrastructure sharing and reuse to promote new fibre deployment. This forms part of the TRC's strategy for accelerating the deployment of next generation infrastructure, which the regulator sees as

essential for the development of the nation's economy. In addition to the database the TRC (regulator) planned to sign various memoranda of understanding (MoUs) covering Right of Way (RoW) issues, sharing and leasing infrastructure, and the prevention of network duplication.

Later in 2017 the first fibre network was deployed at a tourist resort and there is some evidence of limited FTTH investment by Zain and Orange.

Kuwait

Telecom policy has become increasingly pro-fiber in Kuwait over the last couple of years. In 2016 structural regulatory changes were implemented, the new regulator CITRA started operation and public discussion of incumbent privatisation re-started. CITRA is working towards achieving 100% fiber connectivity with speeds of 100 Mb/s for every home and 1 Gigabit for every business in Kuwait as a short-term goal. However, in a subsequent term, CITRA intends higher speed connectivity of 1 & 10 Gigabits for every home & business. The regulatory instruments are still being discussed. One of the initiatives currently being studied by CITRA is the launch of a Government-owned National Broadband Company with an exclusive mandate to build and operate a nationwide fiber network and to provide wholesale services to licensed operators based on open-access model.

As early as 2006 there was reportedly a policy debate and speculation about one or more PPPs being used to fund investment in fibre but privatisation seems now to be the preferred approach.

In May 2014, the government implemented the new Communication Law No.37/2014 defining a new independent regulator (the Communication and IT Regulatory Authority - CITRA) and this body came into operation at the beginning of February 2016. Until then in Kuwait the Ministry of Communications (MoC) was both monopoly fixed network operator and regulator.

The incumbent's fixed network is wholesaled to the four leading fixed broadband providers in Kuwait. Starting in 2007, the Phase I fiber investment started to pass 65,000 SDUs (FTTH, GPON). The Ministry of Communications is now implementing GPON phase II which shall increase coverage (in addition to phase I) to more than 50% of all households completing in Q1/2018. Press reports in April 2018 suggested that Phase 2 was only just starting at that time with the target being to reach 50% coverage.

Lebanon

The State incumbent, Ogero, is the vehicle for Lebanon's policy and is required to open the network to other licensed data service providers (DSPs). In May 2018 the Ministry of Telecommunications licensed three DSPs to operate FTTH broadband services over Ogero's FTTH which is under construction. However, no terms nor prices were yet defined for this access. At least some DSPs are also able to deploy their own fibre in limited specific areas.

In autumn 2017 Lebanon's government approved a (loan) advance of LBP150 billion (USD98 million) from the treasury to state-run telco and internet provider Ogero for the first part of a national fibre programme (estimated total cost USD300 million). Implementation has now started and broadband prices have been cut to stimulate demand.

Back in mid-2015, the Government had announced its $600m plan to provide fibre in target areas across the country and LTE mobile broadband in many areas by 2020. A total of 15,000 commercial, banking, financial and economic institutions were to be connected to a direct fibre network in the first phase (by end 2017).

Libya No known NBN policy but in early 2018 the Libyan Post, Telecommunication and IT Company (LPTIC) was re-unified and announced ambitions for US$1.7bn in mobile and fibre.

Morocco Deployment seems to be driven by competition between incumbent Maroc Telecom and Orange (formerly Meditel) and since March 2018, a third broadband player, Inwi.

There was a wide-ranging initiative known as *Digital Morocco 2013* which included extension of broadband availability, and an agreement was signed between Maroc Telecom and the Moroccan government to modernize and expand the telecommunication infrastructure. In July 2014 Maroc Telecom was authorised by the Autorite de Regulation de la Poste et des Telecoms (ARPT) to provide commercial fibre-to-the-home (FTTH) services and the regulator also required all telecom players deploying or planning to deploy FTTH networks to establish a price catalogue for wholesale services to enable other players to access their passive and active infrastructures.

In 2016 the press reported that FTTH was available (with 65k homes passed) in every major city following two trials in selected districts of Casablanca and Rabat. In June 2016 it was reported that the incumbent offers two fibre broadband products: unlimited 50Mbps for MAD600 (USD61) per month and 100Mbps for MAD1,000.

In 2017 the Agency of Digital Development (ADD) was been created in order to allocate funds for the digitisation of public administrations, under the country's Digital Morocco 2020 project, which also aims to connect 20% of SMEs by end 2020.

Oman There is a long established open access broadband policy delivered by the Oman Broadband Company (OBC) which is developing an extensive network in this sparsely populated country. OBC plans 50% of urban coverage by 2020, and 95% by 2030.

In 2016 a new fibre ISP (Awasr) and both main licensed operators in Oman went live on OBC's NBN. 2017 saw rapid growth in fibre coverage of Muscat mostly utilising infrastructure shared with the sewer network.

During 2014 the State owned NBN company - Oman Broadband Company – was formed. This was in the context of the national broadband strategy which has three

main objectives — to improve broadband service in the country in a cost-effective and competitive manner, encourage the use of broadband in the Sultanate and to develop the infrastructure of broadband in the long-term with state funding.

OBC is an open access passive layer only. The fibre topology is based on multiple GPONs but is flexible. Operators lease fibre connections at a standard price and run their active layer networks and services (the passive sharing model).

OBC inherited a new FTTH infrastructure in Muscat built over the previous three years by the Haya wastewater concession company. Currently this covers 23% of Muscat Governorate and the target is to reach more than 85% in Governorate of Muscat by the end of 2020. We understand that OBC will both develop this and construct similar open fibre in other urban areas. OBC will also be responsible for meeting the considerable challenge of pushing both mobile coverage and fixed broadband availability out into the wholly uneconomic mountainous areas that so far have not been covered by other operators. The company seeks to cooperate with other infrastructure service providers such as water, electricity, gas and sanitation projects to unlock the potential of amenities available in the Sultanate.

Palestine

Our understanding is that there is a desire to improve telecom infrastructure with fibre but given the ongoing crisis it is not possible to make much progress. There is a vibrant ISP base however with 17 firms operating using bitstream on the incumbent's copper.

Qatar

Qatar is now fibered with Ooredoo (incumbent) claiming 99% household coverage with fibre in 2017 and launching the first 10Gbps service. Qatar has been through the entire NBN lifecycle and is an interesting case study.

In 2008 the Government published a national vision of Qatar in 2030 and this stimulated work on broadband policy because high quality communications were recognised as an important enabler of economic and social development.

In June 2011, the regulator (ictQATAR) published "*Qatar's National ICT Plan 2015: Advancing the Digital Agenda*" which committed $550 million to the policy including establishing a state-owned fibre utility Q.NBN. This company was formed shortly thereafter receiving its telecom licence in June 2013. In late 2013 a National Broadband Plan was published setting out four policy targets:

1) All the population to will be able to choose between a minimum of two broadband retail providers by 2016, irrespective of location;
2) Ninety-five percent of households to have the ability to access affordable and high-quality broadband service of at least 100 Mbps effective download and 50 Mbps effective upload speeds by 2016;
3) All businesses, schools, hospitals and government institutions to have high-quality access to at least 1 Gbps download and upload speeds by 2016;

4) Digital literacy to be expanded to all of the mainstream population by 2016, in conjunction with guarantees of the user's digital privacy, protection of personal data and freedom of opinion and expression

During QNBN's start-up phase, both existing licensed operators (Ooredoo and Vodafone) deployed fibre access networks in some areas. By September 2014 we believe that QNBN had passed only around 40,000 premises compared to Ooredoo's 1H 2014 figures of 287,000 homes passed and 155,000 homes connected[1]. According to sources, Ooredoo was expected to pass 90% of all premises in Qatar by end 2014.

Having being outpaced by the established operators QNBN had to change strategy. In early October 2014, it's sale to Vodafone Qatar was announced although this deal never completed. QNBN has been now re-purposed now as provider of secure Government networks and fibre infrastructure to other operators.

In September 2016, the regulator ordered Ooredoo Qatar to provide unhindered access to its duct infrastructure to QNBN under the terms of the 2015 Reference Infrastructure Access Offer (RIAO). A joint working group was set-up to speed up processes. This ruling followed a complaint by QNBN.

The NBN policy could be deemed a success in the sense that it seems highly unlikely that either private operator would have invested so aggressively in fibre had not QNBN posed a competitive theat.

Saudi Arabia

Until recently the incumbent, STC, and its main rival, Mobily, were both deploying fibre aggressively with 40% coverage deployed in less than 5 years. This seems to have been driven primarily by commercial rivalry. Deployment slowed in 2016 due to low oil price and, presumably, completion of the most attractive areas.

As a result, in 2017 the Ministry announced around USD1.5 billion of financial support for three operators to extend fibre coverage particularly in rural areas (goal is 70% coverage by 2020):

- ITC announced USD930m for 640,000 homes passed;
- STC received USD720m for 1.3m homes passed;
- Zain completed 70,000 rural homes passed with subsidy and seems set to build more as part of the programme according to press reports.

This programme was defined in the context of the National Transition Programme 2020 initiatives, within Saudi Vision 2030 which aims to prepare the Kingdom for a future less dependent on oil.

Tunisia

In 2017 Government selected a consortium led by the Tunisian Internet Agency (Agence Tunisienne d'Internet, ATI) for the new infrastructure provider license. According to Tunisie Haut Debit, the consortium comprises ATI (40%), Tunisian

[1] Ooredoo Group 1H 2014 Results presentation slides, page 13

investment firm Meninx Holding (40%) – which owns several digital companies, including Eo Data Center, Eo Smart Building and Via Mobile – and an unnamed Turkish cable company (20%). The company will be a wholesale only provider of high-speed service (presumably fibre) to operators and ISPs.

There is no NBN policy in Tunisia although in 2014 the national strategic 2014 ICT plan, under the banner "Digital Tunisia 2018" defined six strategic including achieving 100% availability of high-speed broadband for businesses, households and public establishments. In recent years several regulatory steps have been taken to encourage (or in some cases require) additional investment in fixed networks, introduce some element of competition and foster the extension broadband throughout the country. For example, there is a form of structural separation (functional separation) – the incumbent Tunisie Telecom is not allowed to provide services directly to the public and may only retail broadband through its subsidiary ISP, TopNet.

In September 2016, the National Telecommunications Authority (Instance Nationale des Telecommunications, INT) launched a public consultation inviting comments on plans to introduce regulations for the sharing of and open access to fibre infrastructure. The regulator cited the growing popularity of fibre accesses for residential and business customers, but referred to the deployment as 'disjointed'. The consultation covered both passive and active layers while making a clear distinction between all three layers (retail services, active wholesale, passive infra).

UAE

UAE is well known for completing a full migration from copper to fibre. This process was not the result of a formal NBN policy but given that both operators are to significant degrees owned by State investment organisations[2] we could perhaps regard the fibering of UAE as an effective but informal NBN.

In October 2015, the Telecommunications Regulatory Authority (TRA) announced that fixed broadband (not TV) network sharing was now in place throughout the country, allowing Etisalat and Du to share infrastructure and market their services in locations previously only served by their competitor. In 2016 this measure was extended to infrastructure cost sharing between the two operators in new real estate developments. The operators expect to save up to 60% of new build costs in this way.

In March 2016, The Federal National Council of the United Arab Emirates (UAE) passed a draft law leading to the creation of a new regulator for the ICT sector. The new body will be charged with ensuring effective competition amongst other things.

[2] 60% of Etisalat shares are owned by the Emirates Investment Authority (EIA) and 40% are in free float. The alternative operator du is ~80% owned by three different State controlled investment companies (http://www.du.ae/about/corporate-governance/shareholders).

2.3 Observations Regarding MENA Approaches to NBN

In the above survey, we have described various national approaches, and these clearly vary along a number of different policy dimensions.

The key dimensions of an NBN strategy that we observe around the world relate fundamentally to the allocation and handling of:

a) market related risks (affecting revenue);
   - geographically complementary or competitive with existing networks?
   - explicit copper switch-off or incumbent migration?
   - consistency of regulation with NBN policy (especially pricing)

b) execution risks (reflecting construction and then ongoing operations);
   - deliver using incumbent or create new organisation(s)
   - single v multiple delivery companies
   - clear and stable Governance and accountability for NBN management

c) financing (relating to financial structure and ownership);
   - degree of structural separation
   - Government verses private finance
   - USO, availability or other ongoing committed revenues.

These are shown diagrammatically on the next page by comparing the examples of Qatar and Singapore.

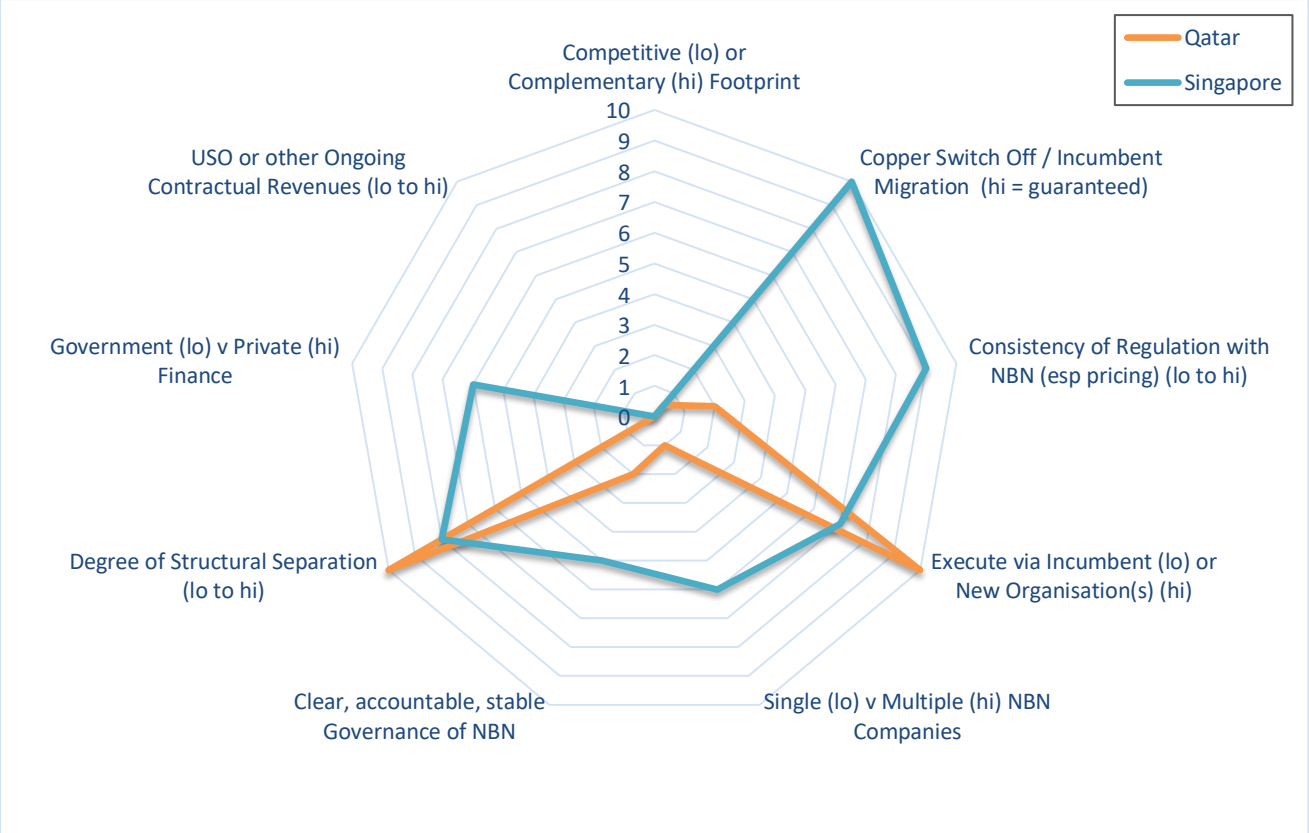


Figure 2 Comparison along key policy dimensions between Qatar's and Singapore's approaches to NBN

As we discuss in section 3 below, our view is that a policy which scores highly on most or preferably all dimensions is more likely to succeed. The relative achievements of these two NBN projects (see chart below) seem to support this.

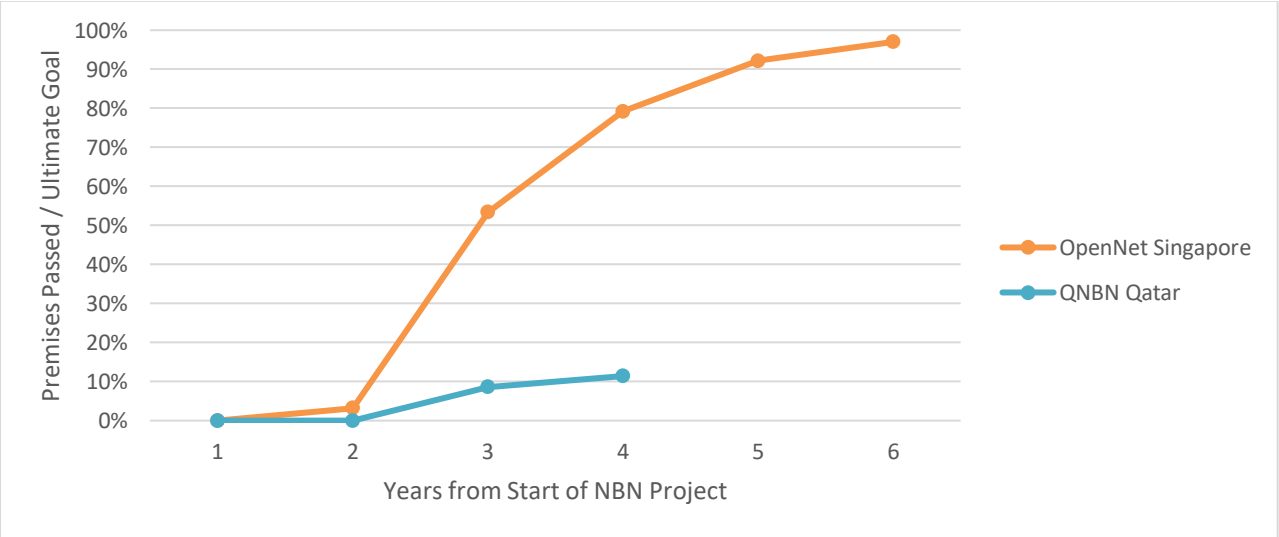


Figure 3 Comparison of success in deployment between Singapore and Qatar

2.3.1 Competitive v Complementary Footprint?

Does the NBN build only in uneconomic areas or does it also build in economic areas most likely already served by other operators? This is a fundamental policy decision that must be made early on in an NBN programme.

For most countries, the extent of rural deployment is a key issue although the degree of urban deployment must also be decided. In city states this question arises in a different way - there is always the issue of whether all parts of a city will be served including those with only low revenue potential or that are perhaps fundamentally uneconomic for socio-economic reasons.

There are the following general alternatives:

Complementary	If the NBN builds only in uneconomic / complementary areas then it is a purely social project and should be financed and regulated as such. From an operational and policy point of view, this is the lowest risk option because, as the network is purely complementary to existing operators, those operators should be supportive. The NBN expands simply their potential reach (on the assumption that access is at a reasonable price).
Collaborative	There may be a middle way collaborative approach possible, for example where the incumbent agrees to become an anchor tenant in return for being relieved of the burden of a high cost copper rural network (as has been discussed in Italy, Poland and elsewhere). Unfortunately, however, there is not yet a clear example of such a policy being put into practice.
Competitive	It is common practice for an NBN to also cover economic areas in order to: a) be truly national and; b) to have some cash generative areas within its footprint which can sustain, or help sustain, the uneconomic areas. Such an approach puts the NBN in competition with existing operators.

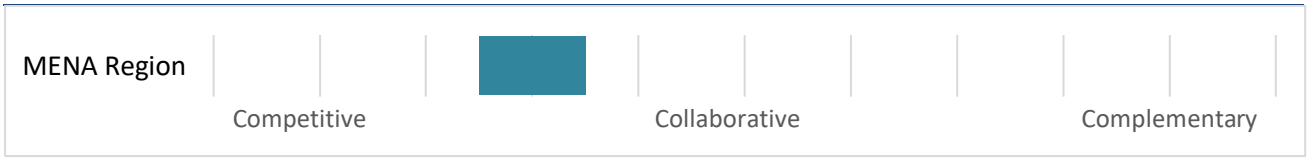


Table 2 Footprint related options and the typical MENA region practice

2.3.2 Explicit Copper Switch-off / Incumbent Migration?

NBN's have arisen in response to slow modernisation of the fixed access network. The primary technology for an NBN is fibre although there may be some wireless used in rural areas. In many countries, there will be some existing coverage of copper or perhaps cable television. In some cases, for example the UAE, the migration of these customers onto fibre was guaranteed before new fibre was built. Achieving this greatly reduces financial risk and is conducive to a single coherent approach to service delivery.

There are the following general alternatives:

Competition	If there is no agreement for the migration of copper customers to the new fibre NBN then a state of competition with exist between the legacy network and the new infrastructure.
Intention	There may be a political or commercial loose agreement that in the medium term customers will be migrated to fibre but until this is a firm contractual commitment, such intentions do not help finance the NBN.
Guaranteed	In the ideal case for an NBN, migration of copper customers is guaranteed and happens soon after an area is declared ready for service. Depending on the outcome of negotiations, the NBN may need to pay compensation or some fee to the incumbent for the migration.

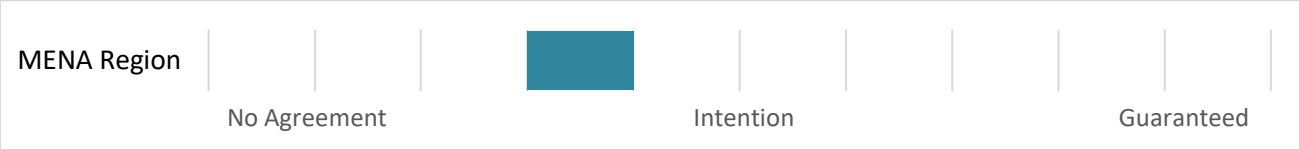


Table 3 Migration from copper related options and the typical MENA region practice

MENA practice varies widely amongst the few examples we have, so it is the average that is shown on the scale above. In UAE, for example, the informal NBN plan was to remove all copper after each of the two licensed fixed operators migrated their customers to fibre. This has been achieved and the UAE is now 100% FTTP.

2.3.3 Consistency of Regulation with NBN

An NBN is a new kind of (wholesale focused) telecom operator with a special place in the sector. Existing legislation and regulatory practice is unlikely to be ideally suited to this new environment and will need to evolve and change, preferably before significant construction begins. However, in many countries the regulatory framework and practices gradually evolve in the face of emerging experience. Although in some ways admirable, such a "learning by doing" approach does not provide stability for management or for investors in the telecom sector.

There are the following general alternatives:

Inconsistent	An NBN can be undermined in several ways by inconsistent regulatory policy but perhaps the most direct is through pricing. In unreformed countries, monthly line rental has often been held uneconomically low (which is one reason why historically there has been low investment in the fixed network). It is very difficult to deliver a sustainable or even bankable NBN project when the generally accepted price point for broadband in that country is artificially very low. Where licences for deployment are still required, inconsistent issuing of infrastructure licences of course would pose another significant difficulty for an NBN policy. More subtly, failure to license a range of service providers could make it difficult for the NBN to present an attractive range of retail products to the customer thereby posing unnecessary market risk by a different means.
Loosely Aligned	Regulatory practice has not yet evolved to be supportive of the NBN but if there are at least no major difficulties in pricing then this state of affairs need not be too damaging.
Consistent	In an ideal world, regulatory policy and, in particular, the regulation of access and pricing, is consistent with the NBN policy and is stable and predictable over time. Such a regulatory framework will provide a financial mechanism to enable universal service with the burden of an economic areas fairly shared across industry and government.

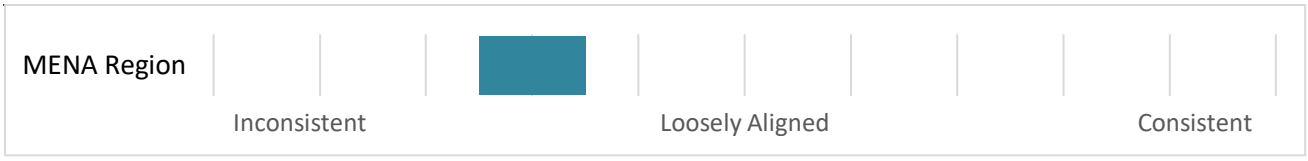


Table 4 Regulatory consistency and the typical MENA region practice

MENA practice varies widely amongst the few examples we have, so it is the average that is shown on the scale above.

2.3.4 Degree of Structural Separation

In any fibre network business, there are three fundamental layers in the value chain, as shown in the table below. In a traditional PTT the three layers have long been conflated within a single organisation often to the extent that the organisation does not even realise they can be separated. At the other end of the spectrum, in Sweden, Singapore, and New Zealand and to varying degrees in several other countries, the three layers are separated into completely independent companies.

	Description	Business Model	Primary Assets	EBITDA %
Service Provision	Competing service providers delivering broadband, TV, special data services, home security and so on.	Sales and marketing driven. Provide and bill for broadband, TV etc. services to the end-customer at home.	Brand is the main asset. Also business processes / IT systems. Economic asset life of <3 years.	~15% Operating costs dominate and there is relatively little capital investment.
Wholesale Active Layer	Builds and operates a shared but secure Ethernet network that delivers services from different SPs into the home.	Operations driven. Invests in and operates telecom equipment to provide wholesale services as required by the service providers.	Combination of active Ethernet & optical equipment (inc. home gateway) with complex software systems. Economic asset life of 4-7 years.	~25% Combination of capital investment in equipment and some significant operational systems and ongoing costs.
Passive Infrastructure	Specialised real estate business - invest in the construction of a long-life asset to rent out to service providers.	Real estate business. Builds and then maintains passive infrastructure.	Physical infrastructure (ducts and fibre). Economic asset life of 25-40+ years.	~90% Major initial capital investment followed by very low operating costs.

Table 5 Description of the three layers in any wireline broadband business

As a general principle separation of each layer provides transparency in pricing and efficiency in operation. Also, the different businesses appeal to different types of investor so the overall system will be better and more efficiently financed. By enabling a greater degree of competition in services this approach, if implemented effectively and sustained over time, will bring significant benefits to customers.

Regarding an NBN, there are the following general alternatives for the degree of separation:

Conflated	All three layers might be conflated within a traditional PTT that is charged with delivering an NBN. If other service providers are allowed access to the network, then they will be offered a form of bitstream wholesale product and adequacy of the price and terms for this will depend very much on the effectiveness of local regulation.
Operational Separation	Whether the NBN is delivered by a new company or by traditional incumbent, there should be some degree of operational separation at the very least. For an NBN Co this would mean at least different arms-length units tackling the passive infrastructure and the active layer. Around the world NBN companies do not provide retail services and to do so would be bad policy.
Structural Separation	With full structural separation, all three layers are independently owned and operated. The NBN may own all or part of the passive infrastructure different parts of the country. In turn the NBN will work with one or more active layer operators, usually under concession contract for several years. This operator (or operators) provides wholesale services only to other licensed service providers. They should not provide services to end-users even if these are large corporations which have demands greater than small ISPs.

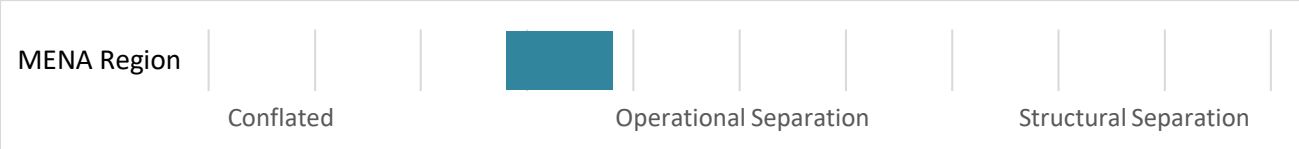


Table 6 Degree of structural separation and the average MENA region practice

MENA practice varies widely amongst the few examples we have, so it is the average that is shown on the scale above. We also consider passive and active layers separately. An NBN programme delivering at the passive layer only, without an independent operator neutral wholesale active layer, does not make policy fully effective in terms of structural separation. However, in countries where the number of service providers is artificially restricted this is perhaps a moot point.

2.3.5 Execute via the Incumbent(s) or Create a New Organisation(s)?

Any country starting an NBN programme faces a decision about the role of the incumbent. On the one hand, they are usually the largest or only wireline infrastructure operator, have large resources, long experience and market power. On the other hand, incumbents are slow to change, most likely have forgotten how to build access networks on a large scale and, absent a clear competitive threat, their economic incentives often favour the status quo. There is also the issue of complexity and the risk it poses to timely and effective delivery:

- On the one hand, any established operator has built-up an internal culture and series of processes which suit the existing business and networks. To turn these all around and take on a large scale NBN construction project imposes numerous strains, tensions and challenges. However, there is also a large organisation with considerable resources to bring to bear to the challenge.
- On the other hand, starting a new NBN company is not a trivial exercise. A new organisation must be created doing something that has not been done before in that country, it must change a complex industry and do so in the face of some level of opposition from the incumbent and any other established operators. Every single process, design, every decision must be taken for the first time since they have so little experience. Such projects are inherently risky and highly dependent on quality of management, Governance and stable political support.

There are the following general alternatives:

Rely on the Incumbent	Government does a deal with the incumbent who will then build and operate a new fibre network in return for financial and regulatory support. Given the imbalance of information and lack of market testing, this approach will often end up being expensive the government and also entrenches any existing inefficiencies in the incumbent for years to come.
Mixed	The country could be carved up into different regions some modernised by the incumbent and the others by one or more (presumably subsidised) NBN Cos. Another form of compromise - which we have not seen yet in MENA - is a policy leading to a new focussed organisation being carved out of the incumbent. New Zealand's UFB (NBN) policy has had this effect where the new local fibre company, Chorus, was de-merged from Telecom New Zealand.
Set-up one or more new NBN Companies	An NBN policy is often taken to mean establishing a new network infrastructure organisation. This is the most explicit realisation of an NBN but brings its own set of risks and issues as discussed above. The nature of the relationship with the incumbent is a crucial factor yet very difficult to get right. Creating a completely new organisation able to tackle a once-in-a-lifetime infrastructure project is a considerable challenge in its own right.

Table 7 Rely on the incumbent or set-up new NBN delivery organisation(s) - typical MENA region practice

2.3.6 Single National Company or Multiple Regional Delivery Companies?

The main reason to have multiple delivery companies rather than one single organisation is to reduce managerial risk. Managerial risk is our term for the impact of the management team on performance. This is impossible to predict with certainty in advance and we observe difficulties around the world in finding the right team for NBN, particularly in the early days when the new organisation must create everything from scratch and carve out its place in the telecom sector.

One way of reducing managerial risk is to have more than one organisation. This approach avoids putting "all your eggs in one basket" and provides a fall-back – if over time it becomes evident that one regional organisation has failed or is underperforming then a more successful one can take over.

Spreading risk geographically was an explicit policy goal in the New Zealand approach to NBN. The country was divided into more than 30 areas which were tendered in one process but each area separately. The result has been the creation of 5 different new local fibre companies (4 new independents and Chorus which is the carved-out Layer 1 and Layer 2 business of the incumbent).

This is quite different to the approach in other countries so far which has been to create a single NBN company with the result that all managerial risk is concentrated in one single entity. The New Zealand approach reduces this risk by creating a handful of alternatives, so that in the event that one of the NBN projects fails a successful team can take over.

There are the following general alternatives:

Single NBN Co	Concentrates managerial risk in a single new organisation. In smaller countries this may be the only sensible option.
Mixed – different operators at different layers	Separate organisations can be defined for the passive and active layer. At either layer, there could be multiple organisations depending on the geography economics the country concerned. For example, Singapore had one passive layer but multiple active layer companies.
Multiple NBN Cos at each layer	There would be multiple delivery organisations in each layer. In medium sized countries, it may be sensible to minimise construction risk with multiple passive layer companies but maximise effectiveness with a single standard active layer.

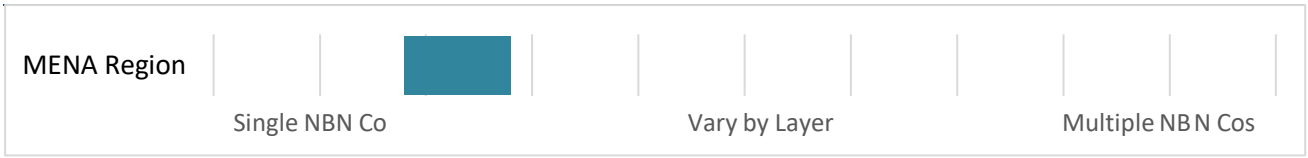


Table 8 Single v multiple NBN delivery organisation(s) – average of MENA region practice

MENA practice varies widely amongst the few examples we have, so it is the average that is shown on the scale above.

2.3.7 Clear, Accountable, Stable Governance of NBN

It is obvious of course that in any organisation good Governance, a clear strategy and effective management are prerequisites for success. This is also true for an NBN company.

In the early days an NBN company generally needs to establish itself both as an effective organisation and also as part of the national telecommunications sector. This is an entrepreneurial type of process for which civil service dominated organisations are ill equipped.

Selection of the core management team is always crucial for success and this is even more the case for an NBN Co facing such significant large-scale challenges to establish itself.

2.3.8 Government Financed or Privately Financed?

There is unlikely to be a good business case for the existing operator(s) or they would be investing in fibre already. This is particularly the case if there is not a clear and prescient threat to existing cashflows from another rival infrastructure. It is likely therefore that the NBN will be a complex, very large, financially very risky programme where the payoff is either quite uncertain or may only happen indirectly through economic development.

By its nature an NBN will entail major capital investment and much or even perhaps all of that investment (depending on target geography) will be in marginally economic or wholly uneconomic areas by which we mean:

- Marginally economic – the project will eventually recover the investment (i.e. payback) but over a long period of time which would not be acceptable to private operators or ordinary financial investors;
- Wholly uneconomic – revenues in these areas do not even cover annual operating costs so these areas run at a permanent and ever-growing deficit.

There are a range of alternatives for financing an NBN which are simplified here as:

Government only	The Ministry of Finance will either grant fund or provide a non-recourse long-term loan to the NBN company. A loan made at a low interest rate and repayable over 20 years is ideally suited to a fibre NBN. Such Finance Ministry loans are common in the cash rich Gulf States. From a policy point of view, the downside is that an NBN relying completely on government finance will not face the same degree of financial discipline that private sector banks or investors would impose. A further issue is that policy may change with governments such funding may not be stable in reality.
Mixed (e.g. a PPP)	In a public private partnership, part of the project is funded by government and part by the private sector. This can be done simply as a joint venture on equal terms but more usually the government takes the high-risk elements of project which gives enough comfort for the private banks to lend money over a long period of time.

	The theory of PPPs is that they bring private sector incentives and efficiencies to public sector projects but in reality this is not always the case. Particularly for innovative or unusual PPs the allocation of risk may end up mainly on the public sector with private investors largely protected from delays, overruns or revenue shortfalls.
Privately financed	The most direct form of private finance for a fibre network is corporate finance provided to the incumbent or a well-established mobile operator. There is an alternative approach using project finance work which funds a particular project rather than the company overall. This approach requires a comprehensive set of long term enforceable contractual arrangements to be in place on both the supply side and the demand side (say an anchor tenancy agreement with the incumbent). The regulator will also probably need to some extent to provide waivers regarding future regulation. Such deals are very difficult put together and we are not aware of any for FTTH so far although the idea is gaining currency in different parts of the world.

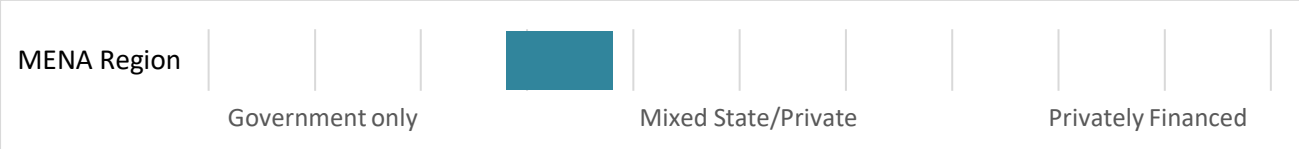


Table 9 Average MENA region approach to financing an NBN

MENA practice varies widely amongst the few examples we have, so it is the average that is shown on the scale above.

2.3.9 USO or Other Ongoing Contractual Revenues

In some ways this is a subsidiary issue compared to the main one of financing the NBN overall but we have listed it as a key policy dimension because the issue of funding service to marginally or wholly uneconomic areas is fundamental in all the most NBN projects we have seen so far. NBN policy is, after all, seeking to correct a failure to invest in infrastructure.

The concept of universal service expresses an ideal of affordable access everywhere within the national territory. In Europe and the USA, the concept emerged in the 1920s in response to the economic challenge of wiring up entire nations. It was clear that the cities and profitable areas would always be served but low income or high cost rural areas might never be served without government intervention. The preferred mechanism in Europe was to create a state monopoly which internalised the cross subsidy between business and city towards low-income areas and high cost rural areas. The USA had a series of regional monopolies with an increasingly elaborate regulatory system involving specific calculated transfers. Our view is that the modern trend for launching NBNs is essentially a reprise of this same old issue prompted by the need once again to wire the nation (this time with fibre).

Wholly uneconomic areas, where revenues do not even cover operating costs, will need continuing financial support. In marginal areas, where the payback on initial investment is simply too long to be commercially acceptable, government one way or another must arrange to make up the difference in cashflows. In both cases, what is really required is a modernisation of the concept of universal service and the establishment of a suitable funding mechanism which will support the NBN in wholly uneconomic areas over the long term.

There are the following general alternative approaches:

Undefined or Ad hoc	With an ad hoc approach, short-term decisions are made to build an NBN in certain areas or to fund certain operations for short period of time without any stable funding formula. The issue of sustainability is left to a future government to worry about.
Cross-subsidy	If an NBN has both profitable and uneconomic areas in its footprint, then it will be able to cross subsidise internally. Depending on the balance of costs and revenues the cross subsidy may well be sufficient to provide service everywhere without the NBN requiring any additional subsidy or financial support. In effect this recreates the traditional 1930s solution by imposing somewhat higher costs on the viable areas. Ultimately such arrangements will need regulation to ensure that the NBN is itself efficient and is not "overcharging" its operator customers.
USO Fund	With USO funds the concept is that there is a central pool of contributions made by different operators (usually in proportion to revenue) and that this cross subsidy is then allocated to the most efficient local operator in those areas needing financial support. In practice, of course, the barriers to entry for a new operator in marginal or uneconomic areas is huge and so these schemes tend to become captured by the incumbent. To some extent the benefits of market testing can be realised by auctioning a series of long-term contracts prior to NBN construction provided of course that there is more than one NBN capable supplier in the national market. However the process to achieve this will be complicated, take time and several steps and needs a supplier ecosystem of a diversity and industrial capacity unlikely to be sustainable in much of the MENA region.

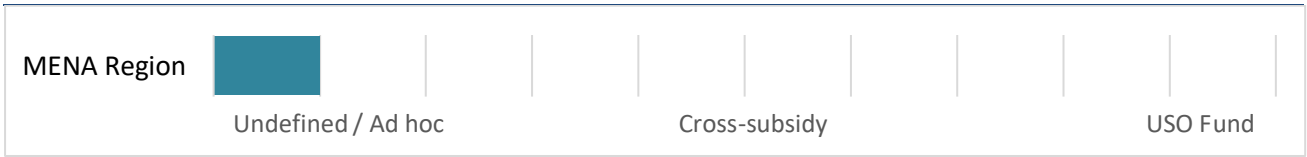


Table 10 Overall approach to funding of uneconomic areas across the MENA region

3 RECOMMENDED POLICY MODEL

In this section we recommend the ideal position on each key dimension of a generic NBN policy. Clearly, these are our generic recommendations and the best policy in any particular country will vary depending on local circumstances. Nonetheless, we believe that moving as far as possible towards our recommended position on each dimension will bring benefits to any particular NBN.

We recognise that the recommendations here may seem rather idealistic or even academic in character. For some they may appear unnecessary or overly ambitious and for others, where the political or security situation locally may be very unstable, they may be simply unattainable. We accept and fully agree that achieving some practical progress in the real world is infinitely preferable to prolonged delay in pursuit of unachievable ideal. These recommendations (and supporting logic) are designed to help policymakers and others involved in NBN. They should at least foster debate. The merit of each recommendation should be tested for your own situation and adapted accordingly.

The diagram below summarises our idealised set of policy dimensions against the average typical practice in the MENA region. In the subsections thereafter explain why we recommend a particular position for each dimension in turn.

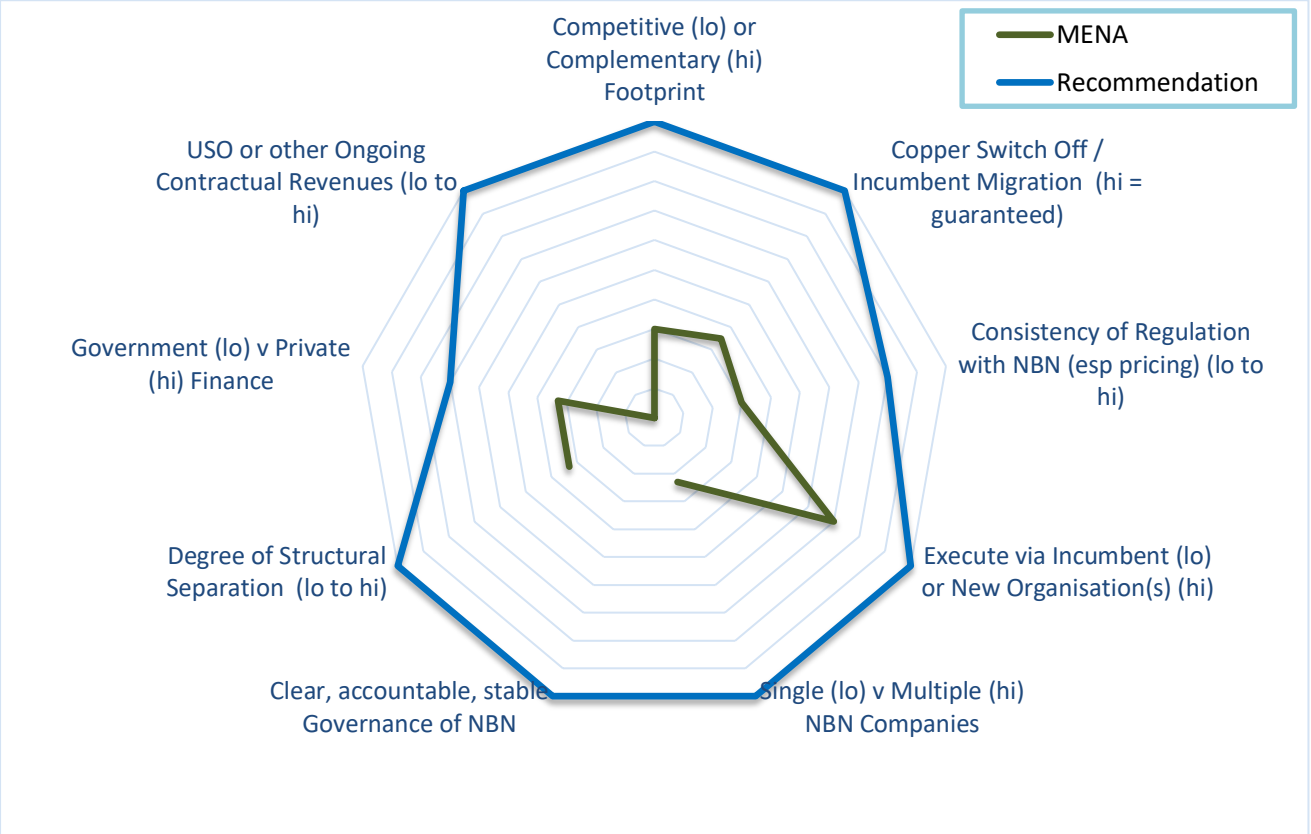
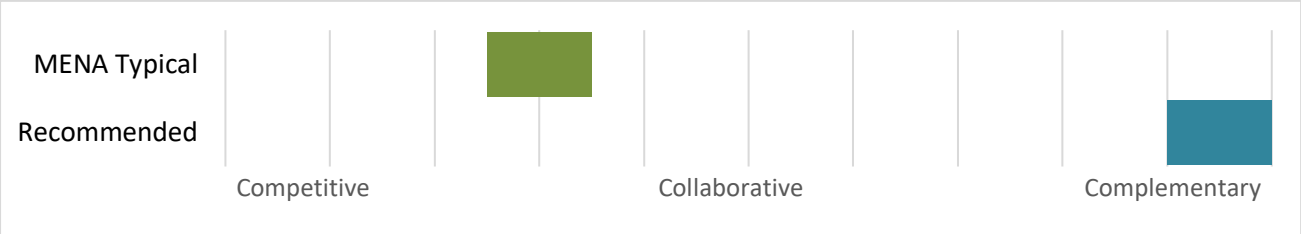


Figure 4 Comparison along key NBN policy dimensions between our recommendations and the average MENA position. ***Being on the outside (a high score) is better than being at or near the centre (a low score) of the radar plot.***

3.1 Competitive v Complementary Footprint

Our generally recommended policy (although specific cases may vary) is to build a complementary footprint unless there is clear and binding agreement re migration after overbuild. We recommend a complementary footprint for the following reasons:

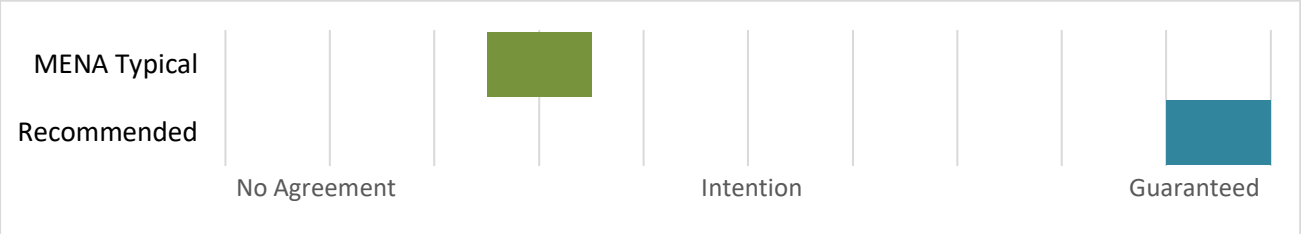
- If existing operators are willing to finance new networks in urban areas then there seems little reason for the government to intervene. Universal service charges should be levied on those networks in order to support the NBN's operation in uneconomic areas;
- An NBN already has an enormous challenge without the additional stresses (financial, organisational, political and regulatory) of competing with established operators. Unless a policy objective is explicitly to create infrastructure competition then it seems sensible to focus on areas that will never be served (or take a very long time to be served) by the other operators;
- Overbuild of fixed infrastructure inevitably greatly increases payback times for all operators. From a policy point of view, the long-term benefit of infrastructure competition is a pressure for efficiency, but infrastructure duplication is not the only way of achieving such pressure. The capital expended and management attention spent on overbuilding in urban areas inevitably delays investment in rural areas which – after all – is probably where the problem is.



3.2 Copper Switch Off / Incumbent Migration

Our generally recommended policy is that an NBN should be based on a guaranteed migration area-by-area as soon as each area is ready for service. We recommend a guaranteed migration for the following reasons:

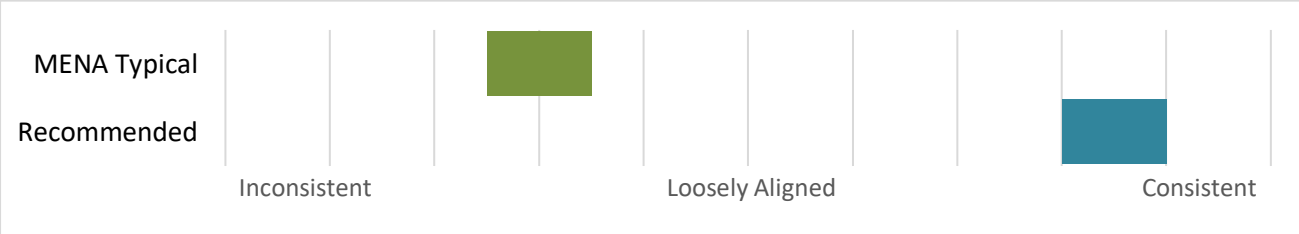
- It is inefficient and wasteful to run two parallel networks when the purpose of the NBN is to modernise and replace the legacy copper infrastructure. To minimise total costs across the sector, policy should be designed to minimise the period of parallel operation;
- Negotiating a contractually binding and enforceable deal for migration off the legacy copper onto the new fibre would force into the open investment plans and commitments. It may be that the established operator(s) is well placed to deliver an NBN infrastructure rapidly and at low cost in certain areas. The process of negotiating migration contract will make this explicit on both sides and help make the national NBN policy as efficient and effective as possible.



3.3 Consistency of Regulation with NBN

Our generally recommended policy is that both the overall regulatory framework and specific measures should be consistent with, and supportive of, the chosen NBN policy. This does not mean that all details should be perfect from the beginning of course, but industry participants and the consumer will all benefit if there is a well-designed and stable framework early in the NBN initiative. We recommend a high (though not necessarily perfect) degree of regulatory consistency as it will:

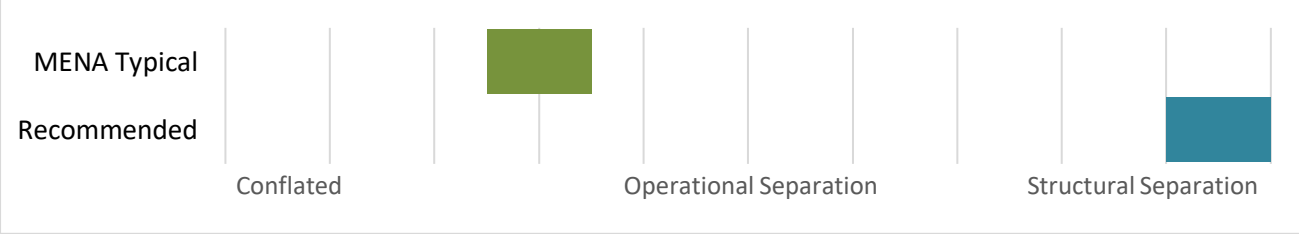
- Speed up implementation of the NBN programme by removing uncertainty at multiple levels;
- Encourage greater private sector financial investment because the regulatory framework is clear and stable;
- Support growth and innovation in retail services that rely on the NBN for access to customers.



3.4 Degree of Structural Separation

Our generally recommended policy is to implement structural separation although specific cases may vary. We recommend structural separation to Government for the following reasons:

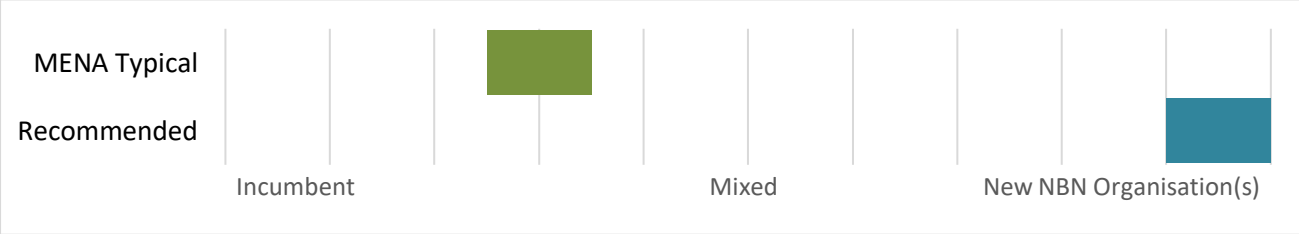
- Both operational and structural separation make contractual and technical interfaces between the different layers explicit and this encourages transparency and efficiency. The difference in ownership that comes with structural separation is more complete and removes the inherent conflict of interest found when there is only operational separation. This encourages greater efficiency and a much more positive approach to products and pricing;
- The inherent conflict of interest between layers in a conflated operator undermines business performance and also pricing at the wholesale level. This discourages the growth of service providers in turn reducing consumer choice and in the extreme case may even reduce take-up of fibre resulting in the country foregoing significant economic and financial benefits;
- Separation brings independent management to each NBNCo reducing management risk;
- By making different types of economic activity directly accessible (passive, active, retail) separation should widen the pool of financial investors willing to participate in a nation's telecom industry.



3.5 Execute via Incumbent v Create One (or More) New Organisation(s)

Our generally recommended policy is to create a new NBN organisation provided that there is not sufficient scale in the country or in the case that the incumbent is unwilling or unable to deliver an open NBN. We generally recommend delivery by new specialised organisation(s) for the following reasons:

- Established operators almost always have mature networks and very little organisational memory of building at scale. A new NBN organisation will be open to test different construction techniques and passive layer designs. It will also optimise from ground up new management processes for the construction phase rather than try to adapt existing approaches best suited to piecemeal small footprint extensions or repairs & maintenance;
- Relying on the incumbent institutionalises a conflict of interest between making the most of the legacy network on one hand and the rapid deployment of the new infrastructure on the other. We prefer focus on the new;
- The organisational structure of incumbents has developed over many years to support a wide range of products and services some of which will fall away in the modern era. Furthermore, working practices suitable for copper are entrenched and extremely rigid yet unsuited for fibre. In operation the fault rate and general characteristics of fibre networks are completely different and a new NBN organisation can build its operations around this new reality much more effectively, in our view, than is possible by modifying an existing complicated organisation;
- Investment in an NBN is an once-in-a-lifetime opportunity to make a nation's wireline telecom sector more diverse, more flexible and ultimately more robust. Relying on the incumbent may be expedient - and in some cases may well be the lowest risk option - but it also most likely forgoes these significant structural benefits.



3.6 Single National or Multiple Regional NBN Companies?

Our generally recommended policy is to establish multiple regional NBN companies if there is sufficient scale and availability of skilled senior management in a country. We recommend multiple organisations for the following reasons:

- Establishing multiple separate regional organisations provides a form of internal competition and reduces overall management and organisational execution risk. It is always the case that a portfolio approach is lower risk than a single investment. Given the complexity and challenge of building an NBN, we believe establishing multiple organisations would bring significant benefit. If one or more local NBN companies fail or underperform then a more successful team can take over that NBN company and policy should anticipate and indeed, encourage this Darwinian process;
- Deployment will tend to be customised more closely to specific local circumstances which will also tend to increase the speed of deployment while limiting costs;
- The approach could differ between the passive layer and the active layer:
    - While fibre construction is inherently local by nature government often prefers to fund a single organisation because of the large amounts of money involved and the burden of oversight involved.
- Provision of wholesale services from the active layer is much more efficient and attractive to service providers if at national scale with complete geographic reach. On the other hand, financial barriers to entry for the active layer are much lower than they are for construction.

3.7 Clear, Accountable, Stable Governance of NBN

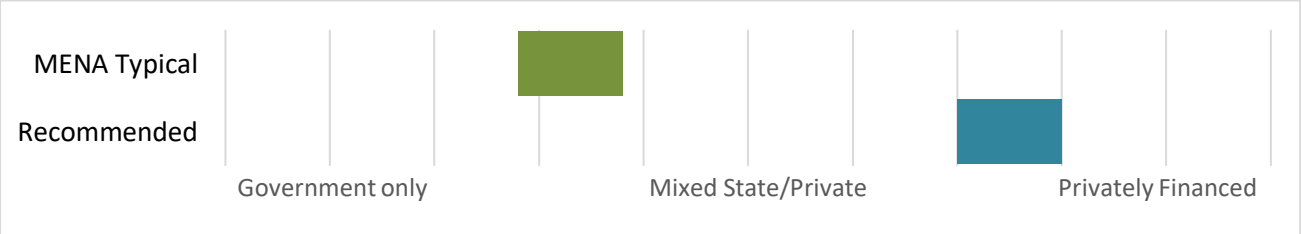
It is obvious of course that in any organisation good Governance, a clear strategy and effective management are prerequisites for success. This is certainly also true for an NBN company.

As the number of NBN projects increases worldwide it will become clearer what works and what does not work technically and commercially. But ensuring effective delivery in any project will always require that the board and senior management team are highly capable people that have an appropriate strategy supported by sufficient financial and political capital for the difficult mission they are undertaking.

3.8 Government Finance v Private Finance

Our generally recommended policy is to maximise the element of private finance that is consistent with the effective and timely delivery of the chosen NBN goal. As, by its nature, an NBN is partly a social / economic development project then in most cases it will obviously require some Government funding through instruments such as long term loans or public private partnerships. To the extent possible in any given case we believe the proportion of funding from private sources should be maximised as a design principle for the following reasons:

- Financial and operational discipline is usually much increased by the involvement of private investors that have their own "skin in the game";
- Creating a bankable NBN project is far from easy but the process forces both short and long-term financing issues to become explicit, particularly those relating to uneconomic areas. This in turn prompts clarity and therefore stability of government and regulatory policy, of pricing, cross subsidy and so on which will all improve the effectiveness and efficiency of the NBN over the long term;
- Significant involvement by private financial institutions creates the possibility for the participation in ownership by established operators while also containing the risk of institutional capture by those same operators. This may help the NBN gain acceptance generally and guaranteed migration specifically from those established operators thus greatly benefiting the overall NBN initiative.

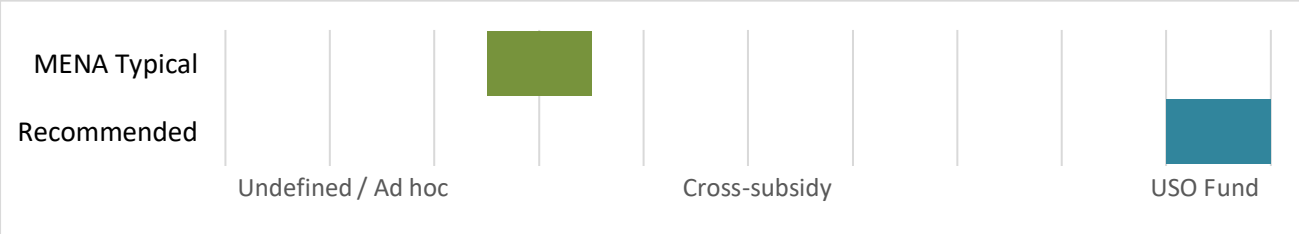


By the nature of its mission we recognise, naturally, that an NBN is unlikely to be entirely privately financed. Indeed, attempting an entirely private project will impose significant delays and most likely prove impossible. The optimal policy, therefore, is to maximise the private component and structure the government contribution in such a way as to create bankable project(s) subject to private sector financial and operational disciplines.

3.9 USO or Other Ongoing Contractual Revenues

Consistent with our preference for attracting private finance, our generally recommended policy is that USO regulation and funding is modernised to support widespread access to open fibre. Traditional voice-centric USOs generally now have little relevance or real-world impact. We recommend modernising USO or introducing analogous contractual revenue schemes for the following reasons:

- Long-term guaranteed revenue can be leveraged financially to underpin significant investment;
- Providing coverage to all is a fundamental goal of NBN and making explicit the social costs involved should help ensure the longevity and stability of the NBN's financing and political support;
- Quantifying the costs and benefits to different operators will help ensure that any legacy cross subsidy within the incumbent is identified and transferred to the NBN.



4 CONCLUSION

In this report we have recommended the ideal position on each of nine key dimensions of any NBN policy. Clearly, these are our generic recommendations and the best policy in any particular country will vary depending on local circumstances. Nonetheless, we believe that moving as far as possible towards our generic idea on each dimension will bring benefits to any particular NBN.

These recommendations and the logic supporting them are designed to help policymakers and others involved in NBN. They should at least foster debate. The merit of each recommendation should be tested for your own situation and adapted accordingly.

Having surveyed the MENA region, we feel that the general practice of NBN policy in the region could be improved, although it is not the case that in any particular country the optimal policy should or could match our ideal on each of all the nine dimensions.

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