



# Rural solution options

for governments in emerging markets to increase broadband coverage in unserved and underserved rural areas

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### About the author

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### About Webb Henderson

Webb Henderson is one of the leading law firms internationally serving the telecoms, media and technology sectors. The firm has developed one of the largest groups of dedicated TMT legal and regulatory advisors, with a team of over 20 practitioners specialising in the telecoms sector. The firm acts for private clients, governments and regulators, including some of the world's largest telecoms groups and preeminent government agencies.



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## Executive Summary

Governments around the world have emphasised the importance of rural broadband, with ambitious targets for rural broadband coverage and affordability. Market forces alone are unlikely to meet these rural broadband targets as quickly as governments want, although the involvement of private sector operators is likely to be critical in any solution. The question is, therefore, what can governments do to accelerate progress towards those targets?

Vodafone has asked us for our high level assessment of possible options available to governments in emerging markets, with a particular emphasis on broadband coverage in unserved or underserved rural areas.

New and upgraded high-speed access and backhaul networks will be required. Access networks in most emerging markets will mainly use mobile technologies, including 3G HSPA and 4G LTE, except for priority users such as schools, health clinics, government facilities etc that will tend to require a fibre connection. Backhaul networks will normally require fibre, or wireless on a transitional basis until fibre is in place.

This report examines four models. Two models provide for significant government involvement, in the form of a Public-Private-Partnership (**PPP**) joint venture with private sector operators and a rural national broadband network (**NBN**). The focus of these models is on the backhaul network, but in some countries it may be appropriate to apply to access networks or backbone networks as well. Governments can facilitate a rural solution in meaningful ways and these models maximise the re-use of existing government infrastructure and assets, as well as providing government with degrees of ownership and control of the enabling infrastructure.

The other models considered are operator-led, which involve coverage and potentially pricing commitments imposed through the process for licensing high value radio spectrum (e.g., 4G LTE). These models tend to be less complex and may lead to quicker and more efficient deployment of rural broadband infrastructure. In any case, we can see a wide range of different ways in which governments can actively contribute to achieving their rural broadband objectives.

The models considered in this report are not mutually exclusive. Either of the models with significant government involvement could be combined with either of the operator-led models, in fact a combination is likely to produce the optimal outcome as they focus on different parts of the network. Potentially, different models could be used in different parts of the country.

In the body of this report, we assess each of the options for a rural solution against broadband objectives that are common in emerging markets, we examine the pros and cons of each option and we look at various different ways governments can actively contribute towards achievement of the rural solution.

The two potential models with significant government involvement are substantially similar, with the difference being in the levels of government ownership and control of the rural entity. These are:

- **Option 1:** A PPP, through a joint venture between the government and private sector operators

- **Option 2:** A government-owned rural NBN.

Although these PPP and NBN models may apply in access as well as backhaul, we envisage a particular role for government in the backhaul network where governments can make a genuine difference, while allowing operators the maximum latitude to develop their business in serving the rural communities<sup>1</sup>. Backhaul costs are a material contributor to retail mobile broadband prices, which means that it is particularly important in this context that backhaul access prices are reasonable for operators providing rural broadband services and should be comparable to competitive backhaul prices in other areas.

The other two models are also substantially similar. They have no specific government involvement and are operator-led:

- **Option 3:** A single rural broadband services provider
- **Option 4:** A licence rollout requirement on each operator to cover rural areas

The key to these models is the commitments imposed on the operators through the process of licensing high value radio spectrum. In each case, the operator would take the commitments into account when bidding for the high value spectrum. As a result, we expect there would be an effective discount to reflect the net cost of meeting these commitments.

Even with the effective discount for the high value spectrum, both of options 3 and 4 will require suitable backhaul. New and upgraded backhaul network investment will be necessary and subsidies of some sort are likely to be required by the backhaul provider to ensure this investment. In combination with this subsidy or other form of contribution, the government will need to ensure the availability of the suitable backhaul services at reasonable prices.

The different options involve different ownership possibilities (from joint ownership, wholly-government owned or wholly-operator owned) and different risk profiles. We have also considered the options in terms of promotion of competition, simplicity of implementation and speed of rollout, as well as the degree of regulatory oversight required. Under each option, a competitive tender process for subsidies will help to minimise the amount of public investment that is required. There is some overlap and blurring of the boundaries between the different models and elements of one could be merged with another to form other potential options. When considering the optimal solution, it will be desirable for the government and for operators that a co-ordinated approach is taken to the roll-out of access and backhaul networks to serve rural areas.

The rural solutions in this paper include consideration of priority users such as schools, health clinics, government facilities, etc. These priority users are likely to require a bespoke, and probably higher-quality, service than may be generally available in rural areas.

We have left rural areas undefined at the moment, but we assume these will be the more remote and poorer areas of the country where there are currently broadband coverage issues.

Governments need to be cautious not to crowd out private sector investment, particularly in those areas that are competitive, or soon to be competitive. This provides for a targeted approach

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<sup>1</sup> In this report, we have not focussed on access to international bandwidth. We appreciate this continues to be an issue in some countries, and will be critical to resolve in providing an effective rural solution.

focussing on market failures, where government involvement is complementary to that of the private sector, while at the same time avoiding distortions of investment incentives of operators. Ultimately, the government should gather supporting evidence that the particular rural areas have the necessary characteristics for inclusion in this initiative.

This table summarises some of the key features of each option:

|                     | 1. PPP joint venture   | 2. Rural NBN   | 3. Rural Broadband Services Provider   | 4. Licence requirement   |
|---------------------|--|--|--|--|
| General description | PPP, through a joint venture between government and private sector operators   | Government-owned rural National Broadband Network                      | Single rural broadband services provider   | Licence rollout requirement on each operator to cover rural areas                    |
| Scope               | Wholesale backhaul services (potentially access); national or regional   | Wholesale backhaul services (potentially access); national or regional | Retail mobile broadband services*; national or regional                              | Retail mobile broadband services*; national  |
| Ownership           | Government-operator joint venture  | Government owned   | Operator owned   | Owned by multiple operators individually   |
| Operation           | Contracted to operator(s)  | Contracted to operator(s)  | Operator   | Operators  |
| Commitments         | Wholesale backhaul access at reasonable prices   | Wholesale backhaul access at reasonable prices                         | Coverage and price; wholesale passive access   | Coverage; potentially price and outside-in   |
| Contribution        | Government: Infrastructure + funding<br><br>Operator: Infrastructure + funding   | Government: Infrastructure + funding                                   | Operator: Infrastructure + funding   | Operators: Infrastructure + funding  |
| Subsidy             | Subsidy wound into the government's contribution to the joint venture  | Subsidy incorporated as part of government's investment                | Through discounted spectrum price; backhaul subsidy like to be required in some form | Through discounted spectrum price; backhaul subsidy like to be required in some form |
| Combinations        | Options 1 or 2 could be combined with either option 3 or 4.<br>* Potentially, options 3 and 4 could extend into the backhaul network, obviating the need for options 1 or 2. |  |  |  |

Summary table of the options from a government's perspective (green = positive; orange = medium; red = negative).

|  | 1. PPP joint venture   | 2. Rural NBN                  | 3. Rural Broadband Services Provider | 4. Licence requirement   |
|--|------------------------|-------------------------------|--------------------------------------|--------------------------|
| Compliance with government objectives                | Green                  | Green                         | Green                                | Green                    |
| Promotion of competition                             | Green                  | Green                         | Green                                | Green                    |
| Simplicity of implementation/speed of rural rollout  | Yellow                 | Yellow                        | Green                                | Green                    |
| Investment required/avoidance of risk/accountability | Yellow                 | Red                           | Green                                | Green                    |
| Regulatory complexity                                | Yellow                 | Yellow                        | Yellow                               | Yellow                   |
| Overall assessment                                   | Strong/credible option | Less attractive option than 1 | Achieves most objectives             | Achieves most objectives |

We see the PPP joint venture option as being a strong and credible solution to the backhaul problem. It is a flexible model that can accommodate the various forms of financial and non-financial contribution required from the government and private sector operators. The open access backhaul network will allow the potential for access infrastructure competition in the rural areas. Also, the government is instrumental in a public private partnership. There may be other benefits through one or more operators being contracted to provide design, build and operate (DBO) services for the joint venture.

Government is likely to consider the rural NBN option as an interesting alternative to the PPP joint venture, but probably not as attractive. The investment and risks involved are substantial for government and the PPP joint venture option is likely to provide a better overall balance of benefits and costs.

The rural broadband service provider option should be of interest to government, particularly if there is a rollout and rural price commitment, together with passive access commitments. It guarantees there will be a rural mobile broadband service provider. Its implementation from the government's perspective should be fairly straightforward. This option has the least moving parts, although suitable backhaul services will still need to be available at reasonable prices.

The licence rollout requirements option should also be attractive to government, as it does achieve coverage – and potentially quite quickly if some sort of outside-in rollout is required. Sharing of

infrastructure should occur through normal operation of market forces, but this adds an additional complication in terms of putting the commercial arrangements in place.

Our initial view is that the optimal solution involves a blend of options 1 and 3 or 4. Option 1 may be difficult to achieve, but it would provide the cleanest solution to the backhaul problem. Options 3 or 4 enhance option 1, by ensuring there will be at least one rural broadband provider.

## Report

The structure of this report is as follows:

- In section 1, we consider objectives for broadband that we see in emerging markets and in particular those objectives that relate to widespread access to broadband services.
- In section 2, we examine each of the four options for a rural broadband solution and consider their pros and cons.
- In section 3, we consider more interventionist models for a rural broadband solution.
- In section 4, we look at various different ways governments can actively contribute towards achievement of an effective rural solution.

## 1 Government objectives

### 1.1 Broadband coverage

Governments in emerging markets can have a range of targets for broadband coverage. The targets in some countries are defined by, for example, average user experience (in Mbit/s) and population coverage, by particular dates.

There also tend to be ambitious requirements in the policy for schools, health facilities and government facilities (**Priority Users**), at faster speeds and greater levels of coverage.

For an average user experience of 5Mbit/s and potentially 10Mbit/s, we understand that, with sufficient amounts of appropriate spectrum, this can be achieved with a 3G HSPA or HSPA+ access network, but an average user experience of, say, 100Mbit/s is likely to require LTE Advanced or FTTx.

The investment necessary to meet coverage targets at these levels, including for Priority Users, is likely to be substantial in most emerging markets. New build and upgraded access infrastructure will be required, as well as new build and upgraded backhaul networks to accommodate the increased data traffic. Rarely will a government have the resources to fund this new and upgraded infrastructure by itself, which means it will be essential for the rural solution to have private sector involvement.

(In this report, when we use the term “**backhaul**”, we refer to the “middle mile” between a point servicing the access network and an interconnection point connecting to the backbone network).

### 1.2 Affordability

Affordability is another critical element for most governments. People in rural communities in emerging markets have low incomes and very little disposable income that can be devoted to broadband services. In this report, we consider various ways that will contribute towards meeting affordability objectives. Governments have a key role to play here, in

particular in removing red tape and making use of its infrastructure and assets to assist in bringing down the cost of the new build and upgraded infrastructure that will be required, but also in terms of government taxes and fees. We also consider measures such as imposing price cap commitments on operators tasked with providing rural broadband services.

### 1.3 Criteria we have applied

For the purposes of this report, we have assessed the different options from a government's likely point of view. At the end of the discussion of each option in section 2, we include a table that assesses the option against this criteria (with green = positive; orange = medium; red = negative).

We have applied the following criteria:

- **Compliance with government objectives:** We assess whether the particular option is consistent with objectives for achieving rapid rural coverage at affordable prices, including in relation to Priority Users. We also take into account the desire that governments may have for infrastructure sharing, as well as the potential benefits of a public-private solution. The options score relatively evenly on this criterion on balance. The government intervention models score slightly better on public-private solution elements, whereas the operator-led models score slightly better on the grounds of coverage at affordable prices.
- **Promotion of competition:** In the main, each option contributes positively towards promotion of competition in the rural broadband services market. The government intervention models facilitate open access in the backhaul network, which will promote competition between operators providing services to consumers in the relevant rural areas. The single rural broadband services provider model includes a wholesale passive access commitment, allowing competing operators to, for example, collocate on the provider's infrastructure. The licensing requirement option maximises the potential for infrastructure competition in the access network.
- **Simplicity of implementation:** We consider how easy it will be to create the relevant arrangements necessary to implement the solution. The involvement of multiple parties is likely to lead to greater complexity in terms of putting in place the relevant contractual arrangements, but also in ongoing governance for the government.
- **Speed of rural rollout:** Related to simplicity of implementation, we consider speed of rural rollout as a criterion. Some options, due to the complexity of the underlying arrangements, are likely to take longer to achieve rural coverage than others. We also consider the efficiency benefits arising in terms of potential re-use of existing infrastructure and bringing capabilities and systems to bear that will lead to a more rapid rollout.

- **Investment required:** Here we look at the amount of investment that the government would be required to commit to the relevant rural solution. Some of the options call for greater levels of government investment than others. We treat high levels of government investment as a relative negative and low levels of government investment as a relative positive in applying this criterion.
- **Avoidance of risk:** Each of the options has different risk profiles insofar as the government is concerned. Each option involves a certain amount of risk transfer to private sector operators, by contracting with them for the design, build and operation of the rural network (to take advantage of their capabilities), but where the government has an ownership interest in the relevant entity, they will still retain much of the risk, including demand risk.
- **Accountability:** Related to risk avoidance, this criterion considers who is responsible if things go wrong with the rural broadband service, either in terms of the rollout or operation of the network. We treat high levels of private operator accountability as a positive for the government, particularly accountability of a single operator (less finger pointing), whereas high levels of government accountability is treated as a negative. In the models involving government intervention, we recognise that, although the operator providing the design, build and operate services will assume a certain amount of risk, ultimately accountability will remain wholly or substantially with the government.
- **Regulatory complexity:** In this criterion, we assess the degree to which the regulator will need to be involved in regulating the entity providing the rural solution. We consider some options, such as the rural NBN, as requiring quite heavy involvement from the regulator (as is the case in, say, Australia and Singapore) and so we regard that as a relative negative. Whereas other options will involve a less onerous monitoring role for the regulator (e.g., of the commitments of licensees) which we treat as a relative positive.

## 2 The options

### 2.1 Option 1: PPP Joint Venture

We have considered a PPP between the government and private sector operators, through a joint venture. We see the PPP joint venture being a wholesale-only entity, providing wholesale transmission services to operators to provide rural broadband services to customers. The PPP joint venture could be applied nationally, to all relevant rural areas, or it could be applied on a regional basis, to rural areas in a particular region. If it is applied regionally, then we can see opportunities for regional government involvement. Depending on the political dynamics in the country concerned, a regional application of the model may be an attractive option, as it can allow a progressive regional government to effectively trial the model, which may then be applied nationwide if successful.

If this model was followed, the government could run a tender for private sector operators to participate in the joint venture. The tender rules would have both qualitative and quantitative elements. The participant operators should have the requisite business experience in providing the relevant telecommunications services as well as being a part of a substantial organisation. Quantitatively, the government will be interested in what the operator is prepared to contribute to the joint venture, in terms of infrastructure, assets and cash and on what terms.

This option differs from the second option, the rural NBN, in that there would be a greater sharing of risk and control with operators and less investment would be required by the government. It differs from the third and fourth options, in that the government would take an ownership stake in the entity providing the rural broadband service.

### Variations

We see this model primarily applying to the fixed line backhaul network servicing the rural areas, but it could be applied to the entire rural broadband network (access and backhaul). Depending on the quality of the backbone network in the country concerned, it may also be appropriate to extend this model to include relevant backbone network infrastructure.

The value that the government can provide, in terms of infrastructure and assets, is likely to be greatest in respect of fixed line backhaul (and, if appropriate, backbone)<sup>2</sup>.

A number of countries have focussed on backhaul as the critical “middle mile” infrastructure for getting coverage into rural areas and, in these instances, it is the backhaul network that is the main target for subsidies. For example (although not a joint venture), the 2008 national broadband plan in **Finland** envisages the construction of fibre middle mile networks so that at least one fibre access point is located no further than 2 km from virtually all permanent residences or offices. This is expected to lead to 99% coverage for the Finnish population by the end of 2015, supporting 100Mbit/s connections. In areas where private network operators lack incentives to build the network, a range of local projects are implemented to expand coverage with the necessary middle-mile segments. These projects receive financial support from different sources, including from European Structural and Investment Funds.

We recommend that the backhaul joint venture be a wholesale-only entity, providing capacity to operators on a non-discriminatory basis. This could facilitate infrastructure competition between competing network operators. In a section below, headed “wholesale transmission capacity service”, we go into further detail on the wholesale services that we would expect the backhaul joint venture to provide to operators.

We see merit in this option being combined with either of options 3 or 4 (both mandating operator coverage in the relevant rural areas). Alternatively, there may be no mandating and operators could choose to provide services in the rural areas, incentivised by access to

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<sup>2</sup> We note that satellite connectivity can provide backhaul access where there is no adequate existing backhaul. Although we can see that satellite can provide a backhaul solution, it is expensive and throughput (rate of delivery) can be an issue for data services. We therefore see satellite as more of a potential interim solution until an acceptable fixed line backhaul is in place.

suitable backhaul services at reasonable prices and likely cost savings by commercial network sharing.

### **Wholesale transmission capacity service**

Backhaul networks are often enduring bottlenecks, particularly on geographic routes which are considered to be natural monopolies or which are otherwise uncompetitive. Backhaul networks are generally capital intensive and require large sunk investments, which makes it economically inefficient for competitors to duplicate. For these reasons, access to backhaul networks is regulated in many countries.

Where the backhaul network is a natural monopoly or the route is otherwise uncompetitive, which will normally be the case in rural areas, there should be a requirement on the backhaul network provider to offer a wholesale high capacity managed transmission service to operators for a reasonable price that is comparable to what would be available in a competitive market.

A wholesale high capacity managed transmission service provides specified and dedicated capacity between an operator's co-location site serving their access network in the relevant area and that operator's nearest point of interconnection in the backbone network. The service may be defined as the transmission of communications from one of these transmission points to the other point via symmetric network interfaces.

The network interfaces would include Ethernet, PDH and SDH network interfaces used to provide a transmission rate of 2Mbit/s or above. These network interfaces should be provided on a non-discriminatory basis. The service would be symmetric, in that it has the same data rate in both directions. The operator acquiring the service should be able to choose the quality of service that applies and there should be a service level agreement (SLA) with meaningful consequences for failing to meet the service levels.

The backhaul network would ordinarily be fibre, but may sometimes be microwave or copper. Although dedicated capacity is provided to each operator, the same physical link can be shared with others.

The operator also needs to be able to interconnect their network and equipment with the backhaul network and equipment in order to provide its retail broadband services. Access to facilities such as ducts and the building access space of the backhaul network provider at both transmission points are necessary for mobile operators to interconnect their equipment and access the wholesale backhaul service. These facilities should be readily accessible and provided on non-discriminatory terms. Again, these access services need to be provided for a reasonable price that is comparable to what would be available in a competitive market with a meaningful SLA.

### **International examples**

PPP joint ventures have been used in several broadband projects internationally, for example:

- In the **Netherlands**, a public-private consortium including the local municipality, housing corporations and private sector investors formed Glasvezelnet Amsterdam (GNA) to roll out Citynet, a high speed Fibre To The Home network in Amsterdam. Each party invested €6 million in exchange for a 1/3 stake in GNA. Citynet's network offers open access to other operators.
- In **Italy**, the fibre optic network infrastructure provider Metroweb serves the greater Milan/Lombardy region. Metroweb was established as the special purpose vehicle to carry out a joint venture between the municipal utility company A2A and e.Biscom, a telecom service provider. Metroweb is now controlled by F2i, an investment company funded by the state lending company Cassa Peositi e Prestiti.
- In **Sri Lanka** in 2013, the government sought tenders for a licence to operate a national backbone broadband network. In 2013, it was announced that Sri Lanka Telecom (SLT) had been awarded this new licence, under which SLT will function as the National Broadband Network (NBN) operator, delivering services via its nationwide fibre optic network to other telecommunications service providers. SLT was required to cover all the 329 divisional secretariats and 24 districts in the country with high-speed broadband connectivity over the NBN, within a five year period.

### Ownership

Under the PPP joint venture model, the government and one or more operators would each contribute infrastructure or funding to a joint venture, special purpose vehicle (**SPV**) in return for equity. The government (including for these purposes regional government, utilities and other state owned companies) owns infrastructure and other assets that will be highly valuable in the rollout of a rural broadband network and which is likely to lead to a reduction in costs. Any operators that invest in the joint venture should do so on arm's length terms, including erecting information barriers where necessary to ring-fence any sensitive data from other parts of the business.

It would clearly be desirable for the incumbent backhaul provider that serves the rural areas to be a party to the joint venture. They have the existing infrastructure that can be used and will be valuable to the SPV, as well as avoiding unnecessary duplication. However, their participation would need to be on reasonable terms. Nevertheless, we do not see it as essential for the success of this model that the incumbent backhaul provider becomes a shareholder in the SPV. They may, for example, lease access to their passive (or active) infrastructure to the SPV, without being one of its members, and other operators may have valuable infrastructure that can be used by the SPV.

Notwithstanding the use of a tender selection process, we see participation in a joint venture will present numerous challenges for both the government and the operator, particularly in terms of reaching agreement on asset valuation and joint venture governance.

These challenges will increase if there are private investors alongside government in owning the infrastructure being tipped in to the SPV or if more parties join the joint venture (such as regional governments or other operators).

### Operation

The operators that participate in the joint venture could be contracted to design, build and operate (**DBO**) the backhaul network to be owned by the SPV. We expect that, having taken responsibility for DBO, the operators will bear some risk associated with these responsibilities. This would also mean commensurate revenue for providing these services, to reflect the risk taken. If there are two or more participating operators, the DBO provider could be one of those operators (or one operator for each particular region) or the DBO provider could be each of the operators acting jointly.

The DBO operator(s) could also take responsibility for providing high speed broadband (fibre or fixed wireless) connectivity to Priority Users in the rural area to meet the government's objectives.

### PPP Joint Venture – pros and cons

We have considered the pros and cons of the PPP joint venture option from the government's perspective (see section 1.3 for further detail on the criteria):

|  | Government's perspective   |
|--|--|
| <b>Compliance with government objectives</b> | Positive – Achieves a “public-private interplay”; pushes enabling infrastructure into rural areas; (although no retail pricing commitment) |
| <b>Promotion of competition</b>              | Positive – Open access in the backhaul network will promote competition between operators providing services to rural consumers            |
| <b>Simplicity of implementation</b>          | Medium – Likely to be some time to put in place arrangements (valuation, governance issues etc)  |
| <b>Speed of rural rollout</b>                | Medium - Relatively quick deployment   |
| <b>Investment required</b>                   | Medium - Re-use of existing infrastructure; bringing in operator expertise in DBO  |
| <b>Avoidance of risk</b>                     | Medium - Sharing of build / demand risks with operator (cf. rural NBN)   |
| <b>Accountability</b>                        | Medium – Government party takes some responsibility  |
| <b>Regulatory complexity</b>                 | Medium – Likely to be on-going regulatory oversight of pricing and SLAs  |

## 2.2 Option 2: Rural NBN

Under this option, the government would own the rural NBN entity and one or more operators would design, build and operate the network under a contract with the entity. The rural NBN entity would provide wholesale services on an open access basis and would not provide downstream retail services.

This option differs from the first option, in that government would own all of the entity that provides the rural broadband service and operators would not (at least initially) have an ownership stake. This option differs from the third and fourth options, in that private sector operators would only be involved in the construction and operation of the network.

If there is to be a rural NBN (or especially a nationwide NBN), then we believe it should not be exclusive<sup>3</sup>. In other words, other operators should not be prevented from competing with the NBN so infrastructure competition is preserved. An example of this non-exclusivity is Singapore, where the government subsidised provider of active network services (Nucleus Connect) competes with other active network service providers.

### Variations

Again, we see the rural NBN model primarily applying to the backhaul network servicing the rural areas, but it could be applied to the entire rural broadband network (access and backhaul).

This option could evolve to including other shareholders over time in the rural NBN entity. These could include operators or other types of investors (e.g., infrastructure funds). In Australia for example, it is contemplated that the government there will sell down its shareholding in NBN Co over time.

### International examples

There are several international examples of a government owned, wholesale-only, entity playing a key role in a country's national broadband plan. For example:

- In **Ireland**, the Metropolitan Area Networks (MAN) Project seeks to deploy a duct and fibre network in areas which previously lacked adequate broadband coverage. The project is based on an outsourcing model in that it is 100% publically owned but is managed by a private company, enet, on behalf of the government. Enet has a fifteen year concession contract which allows it to share revenue from the MAN Project and must offer open access to all operators.
- In **Australia**, the government is funding the rollout of a national broadband network comprising fibre, satellite and hybrid-fibre coaxial technologies through government-owned company NBN Co. NBN Co offers access to other operators on a wholesale-only, equal access basis. The government intends to privatise NBN

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<sup>3</sup> An example of exclusivity, although not for mobile, is in Tanzania where the government has prohibited operators from building their own national backbone network to compete with the government-funded one.

Co once the rollout is complete, however the enterprise operating the NBN will remain a wholesale-only provider.

### Ownership

The government would own all of the rural NBN.

### Operation

One or more operators would be appointed to design, build and operate the rural NBN. This could include the operator taking responsibility for providing services to Priority Users. As with option one above, the operator would be expected to take on some risk associated with the DBO tasks it is to perform.

### Rural NBN – pros and cons

We have considered the pros and cons of the rural NBN option from the government’s perspective (see section 1.3 for further detail on the criteria):

|  | Government’s perspective  |
|--|---|
| <b>Compliance with government objectives</b> | Positive – Substantially level playing field for all operators wishing to provide services in rural areas (although no retail pricing commitment) |
| <b>Promotion of competition</b>              | Positive – Open access in the backhaul network will promote competition between operators providing services to rural consumers                   |
| <b>Simplicity of implementation</b>          | Medium – Likely to take a reasonably long time to put arrangements in place   |
| <b>Speed of rural rollout</b>                | Medium – Speed of deployment agreed with DBO operator   |
| <b>Investment required</b>                   | Negative - Government will need to commit substantial investment (query co-investment by other operators)   |
| <b>Avoidance of risk</b>                     | Medium – Bringing in operator expertise in DBO the network (preferable to the government doing it all themselves)                                 |
| <b>Accountability</b>                        | Negative – Government responsible if things go wrong  |
| <b>Regulatory complexity</b>                 | Medium – Likely to be on-going regulatory oversight of pricing and SLAs   |

## 2.3 Option 3: Rural Broadband Service Provider

Under this model, a single operator would be selected to provide a rural broadband service, which we envisage would be provided primarily through mobile technology with the potential exception of connections for Priority Users.

The selected operator would be subject to a range of commitments, including rollout, quality of service and pricing commitments. This operator would be the “default” operator that would have to provide retail broadband services throughout the commitment period. Having a default operator ensures that there is at least one rural broadband services provider serving the rural communities.

We expect there will need to be a reasonable amount of engagement with the operator and other market participants on what commitments will be required. The government will want to be firm, but it will also not want to develop a set of commitments that no operator will accept, even with the effective subsidies on offer.

We see the operator also being required to provide wholesale access to its passive infrastructure. This will allow competing mobile operators, should they wish to do so, to deploy their own network into the rural areas by, for example, collocating their active equipment on the selected operator’s passive infrastructure. It may be appropriate to make such a requirement subject to a wholesale demand test. The nature of this requirement should be clearly set out in advance in the licence commitments so that operators can factor it in to their bid. Any passive access requirements should only be in the areas subject to the rural broadband initiative.

We accept that the selected operator may need to be subject to pricing commitments, such as a price cap which would relate to the average pricing nationwide for the service in question. In a 2013 “Universal Access and Service: Knowledge-based report”, the ITU considered best practices for pricing regulation in the context of universal access services (UAS) policies<sup>4</sup>, where the ultimate objective is affordable services for all, including those in rural areas. The recommended best practice is that retail (and interconnection) rates should be consistent with levels in urban areas, with the subsidy dealing with any losses incurred by the operator because of a limited ability to raise charges to reflect costs<sup>5</sup>.

We envisage that a tranche of high value spectrum to be auctioned (e.g., 4G LTE) would include the operator’s coverage and pricing commitments clearly set out, with the other tranches not having these commitments. Any operators that were prepared to take on these commitments would bid for this tranche. We would expect that the bid price would be less than for the other tranches, to reflect these additional commitments.

This obviously reduces the potential revenue available to the government from the allocation of spectrum and could be considered in fact a form of subsidy by the government.

Although the commitments would be set out in the spectrum licence, we believe the commitments should be technology-neutral, so that the operator can meet the obligation in the most efficient way (whether that is 3G HSPA, LTE or even fibre). This means that the most efficient network architecture can be taken into account when bidding for spectrum, and consequently the associated discount.

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<sup>4</sup> <http://www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/ICB4PAC/Pages/default.aspx>

<sup>5</sup> However, the report also notes that, in countries with very high-cost areas, it has been beneficial for operators to be able to charge slightly above urban tariffs, as a reflection of their costs, for an interim period.

This option differs from the first option, in that government would not have an ownership stake in the entity that provides the rural broadband service. The service would be provided by an operator, most likely an existing operator who can leverage its existing infrastructure. It differs from the second option, in that a private sector operator would provide the service and not the government. This option differs from the fourth option, in that there would be only one selected operator with responsibility for providing services in the relevant rural area.

### Variations

This model could be applied nationally, to all relevant rural areas, or it could be applied on a regional basis, to rural areas in a particular region.

For example, one operator could be required to provide the rural broadband services in one part of the country and another operator could be required to provide the service in another part of the country.

A further variation is a joint venture between two or more private sector participants, who are likely to be operators, who take on the rural broadband service commitments jointly.

We can see this option working well alongside options one or two, where these could provide backhaul support in an efficient, effective and coordinated way. In other words, the selected operator would be required to provide rural coverage, but that operator could use the PPP joint venture network or the rural NBN network for the backhaul portion.

### International examples

Single operators have been appointed by governments to provide broadband services in a number of countries internationally (while competition is maintained in the rest of the market), for example:

- In **Sweden**, the coverage obligation in one license in the 800 MHz auction was to provide service of at least 1Mbit/s or better to a list of stated addresses identified as being broadband 'not-spots', lacking any other forms of broadband connection.
- In **Singapore**, a tender to deploy the passive network infrastructure which makes up the Next Generation NBN throughout Singapore was won by OpenNet, a consortium consisting of Axia NetMedia, SingTel and several other Singapore corporations. OpenNet directly owned the core fibre infrastructure, but was subject to a universal service obligation requiring that it offer equal and open access to all operators. In 2014, other members of the consortium agreed to sell OpenNet's fibre assets to the Net Link Trust, an entity initially beneficially owned by SingTel. The OpenNet example is relatively unusual, as its coverage area included otherwise competitive urban areas as well as less competitive suburban and rural areas of Singapore.

### Ownership

The appointed operator(s) would own the rural broadband network.

### Operation

The appointed operator(s) would design, build and operate the rural broadband network, subject to the commitments that it has accepted as part of the appointment.

If there is a geographic split, then the operator responsible for deploying network in the relevant rural area would be responsible for providing services to Priority Users in those areas.

### Other considerations

If options one or two are not pursued, then the rural broadband services provider will need to confront the backhaul problem. The existing backhaul network will, as previously noted, require new and upgraded network investment. They will need to provide a wholesale transmission capacity service to the rural broadband service provider over that new and upgraded network.

However, there are two issues. Will the existing backhaul network provider undertake this investment and will the terms of access be suitable to enable the rural broadband service provider to deliver under its licence commitment?

We believe that subsidy will be required to incentivise the existing backhaul network provider to undertake the necessary investment, at least in most rural areas. We discuss the different ways in which subsidies and other forms of contribution could be provided in section 4 below. However, in return for this subsidy, the government needs to ensure that a suitable wholesale transmission capacity service is available to the rural broadband service provider at a reasonable price and with a meaningful SLA. This could be achieved through either a contractual commitment from the backhaul provider or through regulation.

Potential operators will require clarity on this issue to be in a position to bid for the tranche of high value spectrum that includes the rural commitment.

### Rural broadband service provider – pros and cons

We have considered the pros and cons of the rural broadband service provider option from the government’s perspective (see section 1.3 for further detail on the criteria):

|  | Government’s perspective   |
|--|--|
| <b>Compliance with government objectives</b> | Positive – Addresses coverage; price commitments in rural areas                              |
| <b>Promotion of competition</b>              | Positive – Passive access will promote competition with potential for operators to collocate |

|                                     |   |
|-------------------------------------|---|
| <b>Simplicity of implementation</b> | Positive – Quick to put in place arrangements (although backhaul to be resolved)            |
| <b>Speed of rural rollout</b>       | Positive – Quick deployment   |
| <b>Investment required</b>          | Positive – No government investment required (though will be reduced spectrum revenue)      |
| <b>Avoidance of risk</b>            | Positive – Operator bears build/demand risks  |
| <b>Accountability</b>               | Positive – Single responsible entity if things go wrong                                     |
| <b>Regulatory complexity</b>        | Medium – Oversight of commitments and passive access. May need to regulate backhaul prices. |

## 2.4 Option 4: Licence rollout requirements

Under this model, each mobile operator would be required, under the terms of its licence, to rollout their mobile broadband network to rural areas. Each operator would be subject to a range of commitments, including rollout commitments and potentially pricing commitments. We have assumed there would not be open access, but network sharing and national roaming would be permitted and driven by commercial forces.

Because the commitments would be set out in each license for the high value spectrum, we expect that the bid prices would be less than they would otherwise be if there were no such commitments.

We note that the backhaul issues we refer to in respect of the third option would also apply in respect of this option.

This option differs from the first and second options, in that government would not have an ownership stake in the entity that provides the rural broadband service. It differs from the third option, in that each operator would be required to provide broadband services in the relevant rural areas.

### Variations

To make this model more attractive for the government, an outside-in or accelerated rural rollout requirement could be imposed. This will be an issue for operators concerned as it raises their costs and defers the time when the operator can get a return on their investment out of the urban areas. It would be politically appealing for the government and may be acceptable to operators if they could quickly deploy the rural network.

However, outside-in exacerbates the backhaul issue. For this option to work for the operators, there would have to be a speedy resolution of the backhaul issue and other impediments, such as red-tape issues referred to in section 4.4, would need to be removed.

Again, we can see this option potentially working alongside options one or two, where these could provide backhaul support in an efficient, effective and coordinated way. In other words, the operators would be required to provide rural coverage, but they could use the PPP joint venture network or the rural NBN network for the backhaul portion.

### **International examples**

There are several international examples of commitments by all licensees to provide services to otherwise uneconomic areas. For example:

- In **Spain**, Vodafone, Orange and Telefónica (licensees of the 800 MHz band) have the obligation to jointly provide access to speed of 30 Mbit/s or higher than 90% of the citizens in municipalities of less than 5000 inhabitants before January 1st, 2020.
- In **Italy**, several hundred small municipalities are attached to each frequency block to be covered with 2 Mbit/s data services in accordance with the timeline: 30% of the municipalities before 31 December 2015 and 75% before 31 December 2017. Before 31 December 2022, 75% must be covered using 800 MHz frequencies (rather than other bands).
- In **Germany**, outside-in was adopted in the 4G licensing in May 2010, where operators were required to deploy mobile broadband to underserved (remote, rural) areas first. Areas with higher populations could not be served until 90% of the underserved areas were served. We understand that this is a “shared” rollout obligation on all operators, which effectively encouraged commercial sharing arrangements before operators could each offer services in the profitable urban areas. However, we also note that this could provide an incentive on the least prepared operators to slow up the other operators by dragging out sharing negotiations.
- In the January 2015 LTE auctions in **Georgia**, operators were required to provide 4G coverage to 30% of settlements with a population of less than 5,000 by 1 February 2016, rising to 50% by 1 February 2017, 70% twelve months after that and finally 90% of all settlements with less than 5,000 inhabitants by 1 February 2020.

## Ownership

Each licensee would own its rural broadband network, although there is likely to be some sharing of infrastructure through normal market forces, which could include a joint venture between the different licensees.

## Operation

Each licensee would design, build and operate its own rural broadband network, subject to the commitments that it has accepted as part of its licence.

This option gives rise to the question of what to do about Priority Users. It may be that a separate Priority User contract should be tendered, available to any operator.

## Licence rollout requirements – pros and cons

We have considered the pros and cons of the licence rollout requirements option from the government’s perspective (see section 1.3 for further detail on the criteria):

|  | Government’s perspective  |
|--|---|
| <b>Compliance with Government objectives</b> | Positive – Addresses coverage; price commitments in rural areas (although no open access) |
| <b>Promotion of competition</b>              | Positive – Maximises the potential for infrastructure competition in the access network   |
| <b>Simplicity of implementation</b>          | Positive - Quick to put in place arrangements (although backhaul to be resolved)          |
| <b>Speed of rural rollout</b>                | Positive - Quick deployment   |
| <b>Investment required</b>                   | Positive - No government investment required (though will be reduced spectrum revenue)    |
| <b>Avoidance of risk</b>                     | Positive – Operator bears build/demand risks  |
| <b>Accountability</b>                        | Positive – Single responsible entity if things go wrong                                   |
| <b>Regulatory complexity</b>                 | Medium – Only oversight of commitments. May need to regulate backhaul prices.             |

## 3 More interventionist models

When governments in emerging markets have considered more interventionist models, they have sometimes taken an interest in single wholesale networks and open access requirements imposed on operators through licensing requirements.

### 3.1 Single wholesale network

A single wireless operator model is being considered, or has been considered, in several countries, such as Rwanda, Kenya, Russia, South Africa and Mexico. However, to date, we are not aware of an actual implementation of the model other than in Rwanda. Rwanda is a very small country and it is early days in the development and operation of this single network model. Mexico has announced its intention to allocate 700 MHz spectrum to a single wireless operator for launch in 2018. Kenya, Russia and South Africa have considered the model, but we are not aware that it has yet been implemented in these countries.

The model has been applied to fibre access infrastructure in some countries, such as Australia and Qatar. However, we contrast these examples due to the fact that there is not the same potential for infrastructure competition in fibre access as there is for mobile broadband.

The main downside that we see in the single wholesale network model is the potential that the relevant entity would be granted exclusive access to high value spectrum. This would remove the benefits of infrastructure competition, which would be achievable if multiple operators were licensed to compete using these frequencies. A monopoly has poor incentives to operate efficiently and provide a high quality of service at a competitive price, which we see as a substantial disadvantage. If the government is not the owner of the single wholesale network, then the government loses control to a large degree and the result will be to create a private sector monopoly which will require considerable regulatory oversight.

### 3.2 Open access requirements on all licensees

Some countries (e.g., Hong Kong) have imposed open access obligations in their licensing process, but it remains uncommon internationally. In large part, we believe this is because multiple infrastructure competitors mean market power problems are less likely to arise and so less need to mandate open access. If market power issues do arise, then *ex ante* regulation, or even *ex post* competition law, are usually adequate to address the problem.

## 4 Other forms of Government contribution

### 4.1 Demand side promotion

Governments (including regional governments) can play a significant role in promoting the rural broadband service to the rural community. This will be a new service in many areas and there will need to be a coordinated awareness- raising campaign undertaken. For example, in the Superfast **Cornwall** project in the United Kingdom, the Cornwall Council and ERDF are investing £1 million in demand stimulation with additional support from the operator, BT. There is a programme of engagement with the business community, through meetings and direct contact, focused on tackling barriers and highlighting opportunities.

## 4.2 Demand side subsidies to rural communities

If the operator is subject to pricing commitments (e.g., its rural pricing is consistent with urban pricing), there is still the question of whether the retail pricing would be above the “affordable” amount for the rural community. If this is an issue, we consider the appropriate way to address it is through directly subsidising rural communities for the use of these services to bring the effective price to an affordable level.

For example, in the **United States**, the Federal Communications Commission (**FCC**) funds the Lifeline program, which subsidises either wireline or wireless phone services for low income Americans including many living in rural areas. In 2014, the FCC launched the Lifeline Broadband Pilot Program to investigate how the Lifeline program can be restructured to allow people to apply their subsidies to a broadband connection instead. The FCC funds these programs in part from a system of fees levied on licensed telecommunications providers.

We see merit in the application of unspent universal service funds towards these direct subsidies to rural communities. Amendments may be required to the existing universal service fund, so that industry contributes fairly and reasonably towards the objectives of universal broadband coverage. Potentially the universal service fund could also be used towards funding supply-side initiatives such as subsidising the rural backhaul network.

## 4.3 Supply side subsidies

In some countries, subsidies are provided by governments through grant funding or loans, to promote the roll out of broadband networks. The **New Zealand** RBI project is a recent example of the application of the grant subsidy model in a broadband context.

## 4.4 Cutting red-tape

Because substantial new infrastructure will be required for any of these rural solutions, it will be important for the government to look for all possible ways of cutting bureaucratic red-tape to enable the fast deployment of this infrastructure. The consent of multiple government stakeholders is often required to establish backhaul routes and local planning requirements can be cumbersome when deploying access networks. Other well-meaning initiatives, such as one-trench policies, can also slow up deployment. Government could help to facilitate approvals with property owners that may be required.

## 4.5 Government in-kind contribution

We believe governments should consider all potential forms of in-kind contribution to facilitate the rural solution. This in-kind contribution can be in return for an equity stake in the PPP joint venture, as contemplated in option one. Or government could provide these contributions on commercial or quasi-commercial terms to the rural operator or the backhaul provider, say under options three or four, and they would then pay the government an amount for these contributions.

In most countries, governments own considerable infrastructure (e.g. roads, utilities, land etc.) that may be suitable for use by operators rolling out backhaul and access networks. Infrastructure is controlled by government in different ways, including through government departments, state owned enterprises and local governments.

A key part of making the rural solution work will be to make real progress on ways in which the government (central and local government) can provide access to this infrastructure to the operator and any backhaul provider in quick and easy ways. This is a key feature in a number of the national broadband plans that we have reviewed. This applies not only to existing infrastructure, but also to new infrastructure that governments plan to push into rural areas. The construction of new roads and electricity networks into these rural areas could be undertaken in parallel or slightly in advance of the new rural broadband networks.

For example, there may be a goal of expanding the electricity transmission and distribution network to rural areas to support social and economic development. Consideration needs to be given of ways of coordinating with the providers of this infrastructure into the rural areas as a way of reducing the costs for the rural broadband solution. The savings will come not only in economies of scope from shared rollout, but also in the cost benefits of having grid electricity to service access and backhaul infrastructure in the field.

#### **4.6 Fiscal support**

The government could look at other measures which, while involving some level of fiscal support, fall short of straightforward funding. For example, the government could reduce or remove import taxes and duties on certain types of electronic equipment necessary for broadband roll-out and take-up. Other options include increasing the duration of the operator's licence. Some countries are easing the licensing requirements for broadband providers, such as reducing or removing universal service contributions in order to free up funds for rollout.

#### **4.7 Other forms of support**

In some instances, international development banks contribute to rural broadband rollout projects. The World Bank has been active in funding broadband rollout projects in several African countries, including a US\$58 million loan to **Gabon** in 2012 to finance efforts to build a fibre connection from major cities to the landing station of the Africa Coast to Europe international undersea fibre-optic cable and two US\$30 million loans and grants to **Mauritania** and **Togo** respectively to assist with fibre optic network rollout. The Inter-American Development Bank has adopted a different approach, funding the development of national broadband plans including granting US\$550,000 to **Mexico** and US\$750,000 to **Nicaragua** to assist with this and specifying in both grants that special attention should be given to increasing broadband use in rural areas.