

Output-Based Aid in Mongolia

Expanding telecommunications service to rural areas

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Output-Based Aid (OBA) is a strategy for using explicit performance-based subsidies to support the delivery of vital infrastructure services in cases where policy concerns would justify public funding. OBA subsidies are thus provided to support the provision of services, for example, in rural areas where the cost of service provision or the combined affordability of the populace might render service provision commercially unviable. In the case of the program of Universal Access (UA) to telecommunications in Mongolia, as in an increasing number of developing countries and emerging markets, OBA is being used as the method to distribute once-only subsidies to network service providers, to meet roll-out targets for voice and Internet services in certain designated remote areas and communities. Typically, the subsidies are awarded by means of minimum subsidy tenders. The subsidies are provided over a typical period of 12-18 months to the winning bidder, during which that service provider must meet the agreed roll-out targets and specified service quality.

This paper describes an OBA pilot project which was designed as the first step in the Mongolia's UA Program, which will ultimately be financed through similar competitions from the sector's Universal Service Obligation Fund. The subsidies were tendered amongst existing licensed telecommunications operators in Mongolia. The winning bidders were required to invest and accept all risks in expanding their own networks to meet the required service roll-out targets in the stipulated time period. Subsequently, they are also obligated to continue offering the services commercially for the duration of their license agreement without further subsidy.

Background

Mongolia has a total population of 2.7 million and the lowest population density in the world, at 1.7 persons per square kilometer. It is a vast country, with wide variation in topography, including high mountain ranges, wide plains and the Gobi desert. The rural inhabitants number just over 1 million. About one third of these inhabits 330 district (soum) centers, while the other approximately two-thirds are herders, who are largely nomadic and move with their herds to different summer and winter localities. They are spread around the country at a density of less than 0.5 persons per square kilometer.

The country has a per capita GDP of approximately US\$950, which has doubled over the last four years mainly due to rapid growth in the mining sector, tourist development, and improved winter weather conditions assisting the rural economy. However, a significant urban-rural inequality has also recently developed and many rural areas have seen population declines of 10% or more over the last few years. Mongolia's adult literacy and education indices, both urban and rural (as well as male and female), are relatively high due to the network of boarding schools set up during the communist era, which achieved a high level of educational attendance despite the nomadic nature of the rural population and which continue to draw a high level of participation.

The telecommunications market in Mongolia is effectively liberalized through the early entry (in the 1990's) of two private sector mobile operators. These two operators – one with the Global System for Mobile (GSM) standard and the other using Code Division Multiple Access (CDMA) technology – currently provide more than 80% of the total customer connections and account for over two-thirds of sector's revenues. The mobile communications operators are growing much more rapidly than the partially privatized incumbent operator, Mongolia Telecom (MT), which is facing several market challenges in both the voice and Internet sectors. The current level of telephone penetration is approximately 36%, and perhaps double of this in the capital city of Ulaanbaatar and the country's two other sizeable cities. A third mobile operator won a license in 2006 and started offering mobile services in the same year. A fourth operator has been licensed to provide mobile service in rural areas and it has announced plans and installed infrastructure to reach more than 50% of the country's 330 soums in 2007. The incumbent operator currently offers "wireless local loop" service in many localities and is expected to secure a fifth mobile license in 2007.

Telephone penetration in rural areas is very low. Both supply and demand factors conspired to limit the capacity of operators to achieve Universal Access (UA) on a purely commercial basis. These include the limiting commercial impact of Government-controlled ownership and incumbent control of the long distance transmission network, combined with the country's vast and challenging geography and the nomadic nature of the rural population. However, both the Government and the private operators are making major investments in infrastructure that are expected to lead to a radical increase in phone service coverage.

Designing the UA Program and first OBA project

The country's Communications Law of 2001 envisaged the establishment of a Universal Service Obligation Fund (USOF) to finance network expansion into the rural areas. The World Bank with the Public Private Infrastructure Advisory Facility (PPIAF) and the Global Partnership on Output-Based Aid (GPOBA) has assisted the Communications Regulatory Commission (CRC) in setting up the USOF and also by seed-financing the initial UA subsidy projects.

When the UA Program was first conceived in 2004, public service in most rural areas was inadequate and unreliable. Service was available only at MT offices in the soum centers and only in business hours. Only in a few soums there were more than a handful of connections for private

and business users. Until recently, no service at all has existed outside the soum centers, in the hinterlands where the herder population lives. However, by the end of 2007, almost 200 of the country's 330 soum centers are expected to have at least one mobile service and 150 of them will have two according to the plans of the mobile operators. Most of the 200 centers will be connected to an optical fiber network or have a digital microwave connection, which offers the possibility of broadband access in the majority of these localities. The established UA targets are the following:

- At least one mobile or wireless operator offering services in each soum centre (villages with typically around 1,000 people);
- An increasing number of soum centers to also have broadband wireless based Internet service, with a small Internet café or telecenter, and with the main school (usually a full range grade school) having subsidized Internet access; and
- At least public access telephony service in the country's 1,500 remote herder communities (baghs), which are typically areas with a very low population density and many are practically beyond the reach of mobile telephony.

The pilot – a US\$259,400 program financed by GPOBA – initially consisted of two components which were intended to be the *first steps* in the roll-out of the UA Program, that would address the above-mentioned targets.

1. *Herder Public Access Telephone Network*. Public access telephones for herder communities in 27 baghs, spread amongst 6 soums in two aimags (Arkhangai and Bayankhongor). They both had mid-range per-capita income relative to other aimags, although with widely different terrain, population density, and economies. Arkhangai (Figure 1) is centrally located on the main East-West “Millennium” route, just less than half way between the capital (Ulaanbaatar) and the western border of the country, with mountainous terrain. It has some potential for tourism, which provides additional demand for communications services. Bayankhongor (Figure 2) is more sparsely populated and remote. It is a large, dry territory extending to the southern border of the country, including some of the Gobi Desert.



Figure 1: Arkhangai Aimag



Figure 2: Bayankhongor Aimag

2. *Soum Centre Wireless Network*. This pilot was designed to provide wireless voice and data services to one soum centre (Tariat soum) in Arkhangai Aimag that to date had only limited service. This soum is also part of the Herder Public Access Telephone Network pilot. The wireless network provides mobile voice and Internet services to the public, including a commercial cyber café. The operator's responsibilities also include the provision of

subsidized Internet access to the school for three years, with a declining level of subsidy. This component was also intended to set up an economic comparison between competing technologies by attracting service providers using different technologies.

The expected subsidies

The international consultant, Intelcon, based on its experience in several prior OBA minimum subsidy tenders, estimated the herder network pilot to require an average one-time subsidy of between US\$ 5,100–6,200 per VSAT terminal. This estimate was expected to provide the operator with a commercially sustainable rate of return after receiving the one-time subsidy. By this estimation, the resulting per capita subsidies would range between US\$5.28 and US\$14.45, depending on the locality, as summarized in Table 1.

Soum	Under-Ulaan	Tariat	Khangai	Jinst	Bayant sagaan	Khuremaal	Total
Total soum population	6,068	5,858	3,554	2,352	4,526	2,466	24,824
Herder population	4,700	4,543	2,895	1,855	3,999	1,950	19,942
Expected subsidy per herder (US\$)	6.64	5.28	9.67	11.86	6.63	11.08	7.69
Maximum allowable subsidy (US\$)	9.32	10.04	13.13	14.45	9.25	13.54	10.91

Total subsidy for the soum centre wireless pilot was estimated to be between US\$ 63,000 (US\$ 47.90 per inhabitant) and US\$ 73,400 (US\$ 55.82 per inhabitant). Table 2 summarizes the whole wireless project which includes (i) the voice telephony service, (ii) the Internet POP services, and (iii) provision of subsidized Internet access to the school.

Pilot component	Expected subsidy (US\$)	Suggested max. allowable subsidy (US\$)	Expected Subsidy per person (US\$)	Maximum Subsidy per person (US\$)
Digital voice telephony	31,000	37,500	23.57	28.52
Internet POP & ICT	23,000	26,000	17.49	19.77
Subsidy to operator	54,000	63,500	41.06	48.29
School Internet access support	9,000	9,900	6.84	7.53
Total subsidy	63,000	72,400	47.90	55.82

Projected subsidy needs for both components were all within the range of subsidies granted on other international OBA-type competitions in the telecom sector. Points of reference for the herder network pilot are the rural UA Fund OBA competitions in Chile and Peru; projects comparable to the soum center networks have been implemented in Chile and Peru for voice telephony and in Uganda for Internet POPs and public access.

In both cases, cost-benefit studies, using consumer surplus calculations, demonstrated that the telephony programs would yield positive economic returns on the subsidies. Economic analysis

for the Internet service and school subsidies did not show immediate economic returns, as in most similar cases internationally. It is very uncommon to be able to demonstrate direct impacts empirically in such rural emerging market situations. The investments therefore represent “market seeding” and are expected to have economic impact from the development of ICT knowledge and capacity in the long run. Evidence for the emergence of “information economy” benefits, such as clearly enjoyed by advanced countries, is beginning to emerge in all continents and many of these cases have been similarly “seeded” by OBA or other forms of assistance in countries as diverse as Uganda, India, Peru and Hungary. Whereas much of the evidence remains anecdotal, projects such as this are also underpinned by convictions that ICT projects which include the provision of access and capacity-building support to schools are laying a good foundation for information-related economic progress. A key element in the design philosophy of the soum centre pilots is that the investments made in these cases were shown to be on a similar or lower and more practical scale than expended on Internet point-of-presence or public access (e.g., telecenter) projects elsewhere in the world and thus considered to carry lower risk.

The bidding

The Communications Regulatory Commission (CRC) conducted two separate minimum subsidy auctions for the herder public access network and the soum centre wireless network. The Request for Proposals (RFP) specified the maximum allowable subsidies and included a draft Service Agreement that would form the basis of the winning licensee’s contractual obligation. The schedule of subsidy awards were stipulated separately in the two Service Agreements to be 20% on contract signature, 60% in two/three stages upon meeting progressive targets over three/four months, and the final 20% after 9 months of successful operation.

Bidders were required to submit evidence of corporate and financial stability, experience in operating rural networks and operating experience in Mongolia. Eligible bidders were evaluated on technical and operating compliance of bids and level of required subsidy. If it was determined, following assessment of all corporate eligibility and technical/operating conditions and service requirements, that a bidder’s proposal was substantially compliant, its financial (subsidy) offer was considered. The winning bidder was then selected solely on the basis of lowest subsidy requirement amongst the compliant bids.

The CRC, held a bidders’ conference prior to issuance of the tender documents, in which all of the requirements of the tenders were presented and discussed, and operators’ questions answered publicly. For each tender there were two bids from operators already active in the respective markets in Mongolia. Three of the four bids were in substantial compliance with all conditions.

The herder public access competition

The winning bid for the herder public access component, submitted by one of the country’s two leading VSAT operators with existing rural services, required a subsidy of US\$180,480, which was US\$6,000 below the allowed maximum. This bidder also offered to provide services beyond

the required herder communities, by including two additional remote soum center service points. The second bid required the maximum allowable subsidy.

In order to ensure year-round accessibility of telecom services by the nomadic target group, bidders were required to propose VSAT terminal configurations that allowed for portability. This was a unique requirement designed for the Mongolian environment, since VSAT technology is usually deployed in only a stationary mode. The winning solution proposed installation of a number of concreted metal “pedestals” for each community, located in the various summer and winter grazing areas, to enable re-deployment from season to season.

The soum centre wireless competition

The winning bidder for Tariat soum centre was the country’s leading GSM mobile operator. The bid offered a combination of a full GSM base station for the voice services and a Wi-Fi network for the Internet, both hubbed to Ulaanbaatar by means of a VSAT link. Competition for this bid was intense, resulting in a winning bid of US\$16,455 (only about 25% of the maximum allowable subsidy). The winning bidder effectively asked for subsidy to support only the Internet and school service components.

Savings resulting from the least subsidy bidding were re-allocated to a second tender, for provisioning of similar services in Chuluut soum, which is in the same province. Although Chuluut was considered to be commercially less attractive than Tariat soum, similar tender documents were prepared and the competition also attracted two bidders, including the winner of the first tender. This competition was won by the second (CDMA) mobile operator, which requested US\$43,000 subsidy. While this subsidy was considerably higher than that of the first competition, both were significantly below expectations and were won under highly competitive conditions in which the winner made a low offer for a strategic reason. The reason was ostensibly to gain market brand advantage and to demonstrate the company’s approval and collaboration with the Government’s UA Program for rural communities. It is not uncommon in OBA competitions worldwide for the initial competitions to enjoy such a market-driven “efficiency bonus.”

Outputs – the services in operation and lessons learned

Both the herder public access network and the Tariat soum centre network were implemented in September-November 2006 time frame and were fully operational before the start of the 2006/2007 winter season. They both exceeded the implementation schedules of their respective OBA Service Agreements, meeting service availability and technical quality targets ahead of their respective 4 month and 3 month time frames for substantial completion. They continue to provide highly satisfactory and valuable services to the present. They have both been paid 80% of their total subsidy amounts and will receive the final 20%, in each case, after a period of 9 months satisfactory service. Both operators also provided a performance guarantee, which will be in place until the 36th month of satisfactory operation. The Chuluut soum centre network has also been installed and commissioned, and service was formally inaugurated in June 2007.

After revenues stayed behind expectations for the herder public access network in the winter months, mostly due to technical problems with the solar power supplies (now rectified) and unusual migration patterns of herders, revenues are increasing towards a more commercially sustainable level (given the subsidies) after six months of operation. A recent user survey at the terminal stations has also yielded information that up to 25% of the users of the network travel (often on horse and camel back) for 10-20km to make calls from the terminals and a further 25% travel over 20 km. The value of the service and the economic benefits of the network are thus very significant. ***The project has more than halved the distance herders now have to travel to reach a phone and more than doubled the frequency with which they avail themselves of the national communications network.***

The winning bidder for the Tariat soum wireless network has reported that two-thirds or more of the community's households have become customers of the mobile network. This is in line with the UA demand survey forecasts. Monthly expenditures on calls incurred by the beneficiaries – a variable that is often difficult to predict for rural telecoms projects – have even exceeded the national average. A significant proportion of the operator's regular customers are herders who live well outside the range of the mobile base station; they travel regularly, with their handsets, to use the service. This is also being reported in other areas around the country that have recently received mobile service at the soum level.

The level of take-up and usage of the Internet service has been lower than forecasted. The first operator is clearly not making a profit from the service, but is using the experience to gain vital information on Internet demand while also expecting the business to be seasonal (and thus to enjoy higher volume in some key months) beyond one or two “anchor customers” such as the country's leading rural bank. In response to this, the future design of the UA Program will need to be selective in how the future investments in Internet service provision are planned and rolled out, as regards both choice of locality and speed of program development. The current experience clearly shows that more capacity building and training for teachers and students is needed to help them benefit from Internet access. This requires also parallel initiatives from the Ministry of Education and from interested NGOs, including the development of more useful content and applications.

Overall assessment

The pilot competitions are considered to be a success for several reasons, namely:

- They resulted in fully compliant bids below the estimated maximum subsidies. This demonstrates that an OBA subsidy auction can work to reach “beyond the market” for both rural telephony and Internet services;
- The pilots have also provided very important knowledge about the demand of rural population for better communications services and enabled to test technical and commercial solutions that can be implemented and adapted to local conditions, including service to nomadic population; and

- The experience of the UA pilots appears to have helped accelerate even commercial expansion by all of the country's licensed operators, e.g., MT has since introduced a CDMA wireless local loop service in various urban and rural areas around the country and it is expected to compete in future tenders.

Key success factors

The important features of the Mongolian experience that have led to success for the pilots and promises success for the whole UA Program have been the following:

- CRC was strongly committed to the UA strategy and UA Program from its inception, and has maintained its corporate commitment and ensured staff continuity, despite changes in the organization's senior management;
- There was a good level of skills transfer and national program ownership at the critical times;
- Tenders were prepared in consultation with operators and stakeholders, which increased acceptance;
- Strong competition in the sector has been a positive factor. Together with the traditional importance of "the countryside" and the least subsidy design of the project, it has been a key factor in overcoming obstacles of increased marginal cost of access provision and connection in remote areas; and
- The GPOBA subsidy has allowed piloting of the UA Program before the operators have started to contribute to USOF. This has demonstrated USOF's benefits to the operators and thus increased its acceptance.

Next steps

In the event of successful pilot, it was expected that the next phase of the UA Program – "seed-financed" by a US\$5.5 million injection from the World Bank followed by USOF's own resources to be built up through a 2% levy on the operators' taxable income commencing in 2007 – would follow suit.

It is expected that in the next two years, the UA projects to be financed under the World Bank's assistance and from USOF's own resources will competitively award subsidies for more mobile base stations in the remaining soums that would not otherwise receive coverage, while VSAT projects will still be used to reach mainly into the remotest areas that cannot come close to being reached by mobile coverage. The Internet service provision will, on the other hand, develop more slowly, focusing on those soums which already have strong voice service markets and which also have the best chance of sustaining commercial Internet services after the award of the one-time subsidies and have "Internet-ready" schools that can most benefit from the service. While broadband Internet will be able to eventually reach the whole country under the UA Program, the pace of development must be realistic in order to ensure that money is well

invested, that risks are minimized, that the benefits are realized, and that the market is developed in a sustainable manner.