4 | TELECOM

Telecom sector reforms have been gradual and government privatized green-field development right from the beginning. Technology played an important role in development of wireless telephony in the country. Thanks to deliberate regulatory reforms and market forces unleashed by free competition there seems to be no model superior to private ownership of wireless telephony.

India has emerged as the third largest telecommunication network in the world after China and the US with the total telephone (mobile + fixed line) subscriber base touching 257 million at end-October 2007. With this, the overall teledensity has reached 22.5 per cent as against 16.9 per cent in December 2006. With the target of 250 million phones achieved ahead of this year's December deadline, the Government is planning to have 500 million connections by 2010, besides nine million broadband lines by 2007-end. Compared to telephony systems of other countries, pricing of the Indian system is the most competitive. One could argue about the service standards but it can be handled by a vigilant regulatory authority. However, low penetration of rural wireless telephony remains a challenge to policy makers as well as to telecom experts.

At present, about 68 per cent of the population lives in rural areas and mobile telecom penetration is a meagre 1 per cent. Compared with urban mobile coverage at about 40 per cent, there is a huge potential to increase rural penetration in the country. Low cost handsets, coupled with lower delivery cost of wireless services has driven the market in 2007. Most mobile operators in India will gain from the increased mobile penetration and their subscriber base will grow at a faster pace in the next three years. Village connectivity using Universal Service Obligations funds is the theme of this first paper of this chapter by Rekha Jain and G. Raghuram. The unleashing of USO funds for mobile telephony has led Indian cellular operators to line up investments of about US$ 20 billion over the next two years to bring over 80 per cent of the population under mobile coverage. The planned investment for the next couple of years is 50 per cent higher than what has been invested in the last twelve years. Sniffing huge potential in the mobile penetration and coverage area of networks, service providers are planning capital expenditure to the tune of US$ 10 billion each in fiscals 2008 and 2009. Given such huge capex plans, the population coverage of mobile services would exceed 80 per cent in the next two years, while providing a much-needed thrust to wireless penetration.

The model proposed for Rural Telephony may be segmented into two parts A and B wherein A constitutes infrastructure in terms of land, tower, power connection, power backup, and associated civil and electrical works while B constitutes setting up of equipment and provisioning of mobile services through installation of BTS with associated antennae and backhaul. Concessions for both A and B could be awarded through a competitive bidding process. An important lesson from this model is that given the asymmetric information which exists between service providers and the government it is best to let competitive bidding decide the right price/right amount of subsidy as the case may be.

A study by Robert Jensen, a Harvard University economist, found that as mobile coverage increased in Kerala, fishermen's incomes increased by 8 per cent, fish prices fell by 4 per cent on average and less wastage was created (Jensen, 2007). It concluded that information makes markets work, and markets improve welfare. It is precisely this welfare that the mobile phone revolution seems to be spreading across India, especially in rural areas. Mobile phones are making conventional economic

transactions more cost- and time efficient, as they often make up for poor infrastructure by substituting for travel. They allow price data to be distributed and enable traders to engage with wider markets.

The second paper in this chapter authored by Pradeep Verma presents the Chattisgarh model of e-government. The paper describes how e-governance can link rural communities to the governing process by riding on the telecom network which is easy to expand. Villagers need not make trips to the nearby town for health and education services or for market information regarding their produce. As part of the e-government master plan, the government of Chhattisgarh intends to provide these services on the internet to its citizens in a secure and controlled manner. These services must be consistently available and have the capacity to grow as requirements increase. State Wide Area Network (SWAN) is being set up to effectively and efficiently meet the requirements of Chhattisgarh for voice, video, and data communications, for a single centralized communications infrastructure.

4.1

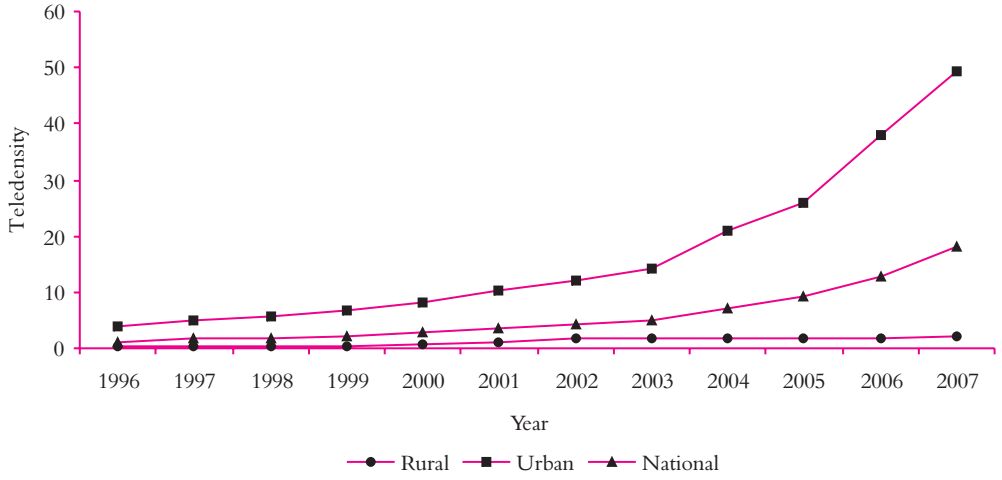
Application of Descending Auction Bidding Model to Telephony in Rural India

Rekha Jain and G. Raghuram[1]

Introduction

The Indian telecom industry has witnessed impressive growth in the recent past. Between 31 March 2002 and 31 March 2007, the number of phones increased from 44.9 million to 205.9 million. The teledensity of 1.30 per cent as of 31 March 1996 rose to 18.2 per cent by 31 March 2007 (*www.trai.gov.in*). Urban teledensity as on 31 March 2007 was 49.5 per cent, whereas, rural teledensity (RTD) was 2.0 per cent. Low RTD leads to lack of quality access to markets, non-optimal production decisions, and lack of supply to rural demands in a timely manner. Quality of life is affected due to inadequate support in (i) emergencies and disasters, or even just safety requirements and (ii) reasonable social and information networks.

In addition, there is a growing disparity between telecom service penetration in urban and rural sectors. The increasing and significant gap is cause for concern. Figure 4.1.1 highlights this gap.



Source: www.trai.gov.in

FIGURE 4.1.1: Widening Gap: Urban–Rural Teledensity

[1] This study was supported by the Group on Telecom (GoT), Centre for Infrastructure Policy and Regulation, Indian Institute of Management, Ahmedabad. GoT is funded by Videsh Sanchar Nigam Limited. We would like to thank Sushma Mandi and Rashmi Narula for providing research assistance.

However, improving RTD poses several challenges. The provision of rural telephones and their maintenance is expensive. Low population densities, small population sizes, geographical spread, and lower per capita income in relation to urban areas are additional challenges. Demand is low and the ability to pay is limited. Hence, revenues generated are often abysmally low. These factors discourage the increase in RTD.

Commercial incentives to provide rural telecom services have historically been poor. The Universal Services Obligation Fund (USOF) created with 5 per cent revenue share of all telecom service providers, largely remained underutilized as there were many restrictive conditions on its usage (Baijal and Jain, 2007; Jain, 2006 and Jain, 2004). Table 4.1.1 gives the collections and disbursements from the USOF from 2002 onwards which shows that significant funds were left unused for want of innovative schemes and programmes.

TABLE 4.1.1
Collections and Budgetary Allocations: USOF
(*Amount in Rs crore*)

Year	Opening Balance	Funds Collected	Funds allocated and Disbursed	Balance at End of Year
2002–3	0.00	1653.61	300.00	1353.61
2003–4	1353.61	2143.22	200.00	3296.83
2004–5	3296.83	3457.73	1314.59	5439.97
2005–6	5439.97	3533.29	1766.85	7206.41
2006–7	7206.41	4211.13	1500.00	9917.54
2007–8	9917.54		10.08	
Grand Total		14998.98		

Source: www.dot.gov.in

The objectives of the USOF to provide public telecom and information services and household telephones in rural and remote areas were enhanced in January 2007 to include the creation of infrastructure for provision of mobile services in rural and remote areas, provision of broadband connectivity to villages in a phased manner, creation of general infrastructure in rural and remote areas (to be determined by the central government from time to time) for development of telecommunication facilities, and induction of new technological developments in the telecom sector in rural and remote areas. Pilot projects to establish new technological developments in the telecom sector, for deployment in rural and remote areas, could be supported with the approval of the central government.

To provide mobile services through USOF, a scheme was launched to support 7871 infrastructure sites to be set up across 500 districts. Mobile services included other wireless access services like WLL using fixed/mobile terminals in the specified rural and remote areas of the country. These sites constituted eighty-one clusters. The objective was to cover those rural and remote areas which had no existing fixed wireless or mobile service.

OVERALL FRAMEWORK

The scheme had two parts: Part A and Part B, each of which was of five-year duration. Part A envisaged a single infrastructure provider and Part B envisaged three service providers offering competitive services utilizing infrastructure created within Part A.

PART A

Within Part A, licensed Infrastructure Providers (IPs) were required to take up installation of telecom towers on the land acquired by them for this purpose in the specified villages, provide electrical connection and engine alternator, construct boundary walls, security cabin and so on as per specifications, in order to cater to the requirement of three Universal Service Providers (USPs). In return, support was provided in the form of a percentage of the capital recovery. It was envisaged that overall expenditure could be kept low through sharing of the infrastructure given its capital intensive nature.

The Infrastructure Providers Category-I (IPs-I) or existing Basic Services Operators (BSO), Cellular Mobile Telephone Service (CMTS) providers and Unified Access Services Licensees (UASL) were eligible for seeking USOF subsidy. The short listed IPs-I were eligible to bid for all the specified infrastructure sites. They were also responsible for the operation and maintenance of the infrastructure so created.

PART B

Support was provided for the setting up of equipment and provisioning of mobile services through installation of Base Transceiver Stations with associated antennae and backhaul. Initially, the infrastructure created was to be used primarily for voice telephony. Later, the same infrastructure could also be used for broadband services.

Only the existing BSO, CMTS, and UASL, called Universal Service Providers (USP) were eligible for USOF subsidy. The USPs were required to install BTS along with battery and power plant, associated antennae, backhaul, and provide mobile services as per the terms and conditions of the service licence. They would be allocated spectrum by Wireless Planning and Coordination Wing, Department of Telecom for the service area for which the bid was submitted.

The three successful bidders for Part-B of the scheme were to be allocated space on the tower to provide the antennae at heights of 38.8 m, 36.4 m and 34 m respectively from the ground level, for each cluster.

Design Features

Identification of a Cluster

Clusters were formed out of a group of districts within a service area that had the same benchmark (explained below). Each cluster contained a number of infrastructure sites. Tenders were separately invited for each cluster.

Location of Towers

The location and the number of towers required in each district were identified on the basis of GIS maps showing non-coverage by fixed wireless or mobile services. Areas where there were GSM and CDMA towers as on 31 March 2006 providing fixed wireless or mobile services were considered as already covered. Radius of coverage for existing GSM towers was taken as 5 km and that for existing CDMA towers was taken as 10 km. Population details corresponding to the 2001 Census were taken. A village or a cluster of villages, which remained uncovered and had a total number of households greater than 400, qualified for provision of towers. Wherever a block headquarter came under the uncovered area, a tower was proposed.

Modified Hata Model (a radio propagation model that is the most widely used model in radio frequency propagation for predicting the behaviour of cellular transmissions in built up areas) was used to identify the location of towers. (*www.en.wikipedia.org/wiki/HATA_Model_for_Urban_Areas*). The modelling was developed for a wide range of frequencies that included the frequency bands used by service operators in India (800 MHz, 900 MHz, 1800 MHz).

Calculation of Benchmark

Benchmark was calculated based on the technology used for BTS and the estimated cost of providing the infrastructure. The location of existing towers and existing population base were taken as factors in locating additional towers under this scheme. The benchmark was the same for all infrastructure sites within a cluster.

Rollout Time Frame

IPs had to commission at least 50 per cent of the infrastructure sites in the service area within an eight-month period and the remaining ones within twelve months of the signing of the agreement. USPs had to provide mobile services within two months of the commissioning of the infrastructure site by the IP.

Agreement between IP and USP

DoT proposed to enter into agreement with IPs and USPs for provision of mobile services. IPs and USPs were to mutually discuss the suitability of the location of the infrastructure site for installation of the towers and provision of the mobile services. The USPs would exchange relevant information with IPs about the space and power requirements for equipment proposed to be installed. The USPs would also share their radio frequency plans with the IP for optimal coverage from the towers. It was expected that all the USPs and IP would adhere to a common tower location keeping in view the overall coverage of the targeted area. It was further expected that the location of the infrastructure sites would be finalized consensually between the IP and USPs. The tower locations for all infrastructure sites were to be decided within two months of signing of the agreement.

In case a consensus was reached between IP and USPs for shifting of the location of the tower from one place to another, or installation of additional tower(s) in the vicinity of the towers to be installed, the IP would take up the case with the USOF Administrator. In case IP and USPs did not agree on a common tower location, the IP would report the same to the Administrator USOF within the stipulated time frame. Service level agreements (SLAs) would be signed between the IP and USPs to ensure round the clock availability of the mobile services. On commencement of the work at the infrastructure site, the IP would intimate the same to USPs for initiating parallel action for installation of the necessary equipment required for provision of mobile services.

Tariffs

Service providers were mandated to charge tariffs as per TRAI tariff orders or the prevailing tariffs of the incumbent basic services operator, whichever was lower. The USP was required to publish tariffs, notifications and provision of information as per the provisions of TRAI Act, 1997 as replaced or amended from time to time.

Mechanism for Monitoring Implementation

Liquidated damages were to be paid by IP/USP for delay in the rollout. In case of interruption of mobile services for a period up to seven days in a quarter, there were to be no deductions from the subsidy. However, there would be deduction in subsidy for USP on pro rata basis if there

is interruption in services for more than seven days in a quarter. However, if there is interruption in services for forty-five days or more in a quarter, no subsidy would be paid for that quarter.

AUCTION DESIGN

A multi-layered 'Informed Descending Auction' was designed to provide subsidy to the IP and USPs in each cluster. It was a sealed bid auction. The bidders had to submit their financial bid(s) for subsidy for one infrastructure site per cluster. The same bid amount was applicable for all the infrastructure sites within that cluster. A starting benchmark for the bid amount was specified for each cluster for both Part A and Part B of the scheme. The bidders had to quote a subsidy amount less than or equal to the benchmark. The benchmark for any subsequent round was the largest amount bid in the earlier round. The bidders were to furnish an Earnest Money Bank Guarantee (EMBG) issued by any scheduled bank for the amount towards earnest money as specified for each state. The amount of EMBG remained the same for all the clusters in a state, irrespective of number of districts in the cluster. The bidders had to submit sealed bids for pre-qualification and separate sealed bids for the first financial bid, for both Part A and Part B.

Rules of Bidding

Sealed pre-qualification bids of all bidders would be opened for pre-qualification. The first financial bids of those who pre-qualified would be opened.

Rules for Second Round of Bidding

For Part A, out of N pre-qualified bidders for a cluster, the lowest N/2 bidders qualified for the second round of financial bidding in case N was an even number and the lowest (N+1)/2 bidders qualified in case N was an odd number. If pre-qualified bidders were five or six, a maximum of four lowest bidders qualified for second round of financial bidding. If there were two, three or four bidders, all the bidders qualified for the second round of financial bidding. In case of only one bidder, the bidder was declared as successful for the cluster. For *Part B, a* maximum of four lowest bidders qualified for the second round of financial bidding. If there were less than four bidders, then all the bidders were declared as successful.

The least quoted bid amount by a bidder from amongst the bidders who qualified for the second round of bidding was the reserve price for the second round of bidding. The bidders, who qualified for the second round of bidding, had to submit a second financial bid for the second round. The bid amount in the second round had to be equal to or lower than the reserve price for each of clusters and the bidder(s) who quoted above the reserve price were disqualified from further rounds. All the bidders who quoted less than or equal to the reserve price for each of the clusters in the second round of financial bidding were short listed.

Ranks were determined keeping in mind the possibility of tie. In case of a tie amongst two or more bidders in any round of the financial bidding, all such bidders qualified for the next round of financial bidding with the same ranking. The remaining higher bidder(s) were dropped. In the event of a tie in the previous round of bidding, the process of bidding continued until a successful bidder emerged. In case of a tie in the conclusive round of bidding, the bidder who quoted the lower amount in the previous round for that particular cluster was declared successful.

For Part A, the lowest offer out of the short listed bids for second round of financial bidding for a cluster, became the representative rate or winning bid for an infrastructure site. For Part B, three lowest bidders of the final round of financial bidding for a cluster were declared successful for signing of the agreement. The amount quoted was applicable for all the infrastructure sites within a cluster.

The agreement for Part-A, would be signed with the successful bidder only in case there was at least one successful bidder for Part-B of the Scheme.

Results of Bidding

There were twenty-one bidders in Part A of which only seven won. BSNL became the largest infrastructure provider, by winning the bid in sixty-three of the eighty-one clusters it had bid for. It did not win in Assam, Manipur, Meghalaya, Mizoram, and Nagaland. It won one out of six clusters in Andhra Pradesh, three out of five clusters in Chattisgarh, two out of three clusters each in Himachal Pradesh and Jharkhand, eight out of nine clusters in Maharashtra, three out of four clusters in Orissa and four out of six clusters in Uttar Pradesh. Reliance Communication was a distant second winner, by winning the bid in six clusters out of the eighty-one it bid for. National Information Technologies Limited won in four out of 51 clusters. Hutchison Essar South Limited and GTL Infrastructure Limited won in three clusters each. Hutchison Essar South Limited had bid in seventeen clusters while GTL Infrastructure had bid in eighty-one clusters. Hutchison Essar Cellular Limited and Quipo Telecom Infrastructure Limited won in one cluster each, having bid in fourteen and twenty-four clusters respectively. The maximum number of bidders in any cluster was eleven and the minimum was four, indicating competition for the bids.

From DoT's perspective, a maximum benchmark of Rs 6.09 lakh per site per year was justified for clusters in Manipur and Nagaland. After the bidding, subsidy for the clusters in Manipur and Nagaland came to Rs 2.12 lakh bringing in a reduction of 65.2 per cent from the benchmark price. The lowest benchmark Rs 3.69 lakh was determined for a cluster in Karnataka, where the winning bid was Rs 98.6 thousand.

The maximum subsidy of Rs 2.76 lakh was declared for a winning bidder for a cluster in Mizoram where the benchmark price was Rs 5.72 lakh bringing in a reduction of 52 per cent. The high subsidy amount could be attributed to the hilly terrain and the difficulty in laying down the infrastructure. Bidders for a cluster in Madhya Pradesh sought the least subsidy of Rs 66.5 thousand against a benchmark of Rs 3.75 lakh, bringing in a reduction of 82.3 per cent.

The largest number of towers was proposed in Maharashtra (1017). The large number of towers reflected both the size of the state and the level of existing coverage. The lowest numbers of towers were proposed in Sikkim (8). Since in the case of Assam, the bidders GTL Infrastructure and Reliance Communications Infrastructure had both bid the same amount in the second round, the bidding went on to the third round.

The total amount of subsidy 'saved' was Rs 228 crore annually for five years, being the difference in amount between the total benchmark costs and the total bid amounts. The final actual subsidy to be paid by the government was nearly 71 per cent less than the estimated benchmark value. The least difference from the benchmark cost in percentage terms was in Chattisgarh (42.0 per cent) and the highest was in West Bengal (83 per cent). This showed that due to competition, the winning bids were far lower than the benchmarks.

Since bid design allowed only the lowest N/2 (if N was odd) or (N+1)/2 lowest bidders to go to the second round, it was important for bidders to come up with bids lower than the benchmark in order to continue to participate in the subsequent rounds. This resulted in first round bids that were on an average lower by 54.5 per cent from the benchmark. As only the lowest bidder in the second round was to be selected, bids were further reduced in the next round.

The interesting dynamics of multiple players and multi-round bidding were demonstrated in the case of the cluster in Arunachal Pradesh, where after the first round of bidding, the reserve price was 20 per cent lower than the benchmark. It came down to 60.9 per cent of the benchmark after the second round (*www.dot.gov.in*).

For Part B, there were eighteen bidders of which twelve won. The top three winners were BSNL (59 out of 81 clusters), Reliance Communications (53 out of 74 clusters), and Reliance Telecom (40 out of 81 clusters). The other winners were Hutchison Essar South (14 out of 17 clusters), Dishnet Wireless (16 out of 22 clusters), Idea Cellular (12 out of 16 clusters), BTA Cellcom (12 out of 15 clusters), Aircell Digilink India (10 out of 13 clusters), Bharti Airtel (10 out of 42 clusters), Hutchison Essar Cellular (10 out of 14 clusters), Bharti Hexacom (3 out of 3 clusters), Idea Mobile Communications (3 out of 5 clusters), and Fascel (1 out of 5 cluster).

BSNL did not win in Jharkhand and Orissa. Reliance Communications did not win in Assam, Arunachal Pradesh, and Tripura. Reliance Telecom did not win in Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharastra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Jammu and Kashmir, Manipur, Meghaya, Mizoram, Nagaland, Kerala, Rajasthan, and Uttaranchal. From DoT's perspective, maximum subsidy was justified for one of the clusters in Himachal Pradesh (Rs 3.26 lakh). After the bidding, the subsidy for this cluster was reduced to zero bringing in a reduction of 100 per cent from the benchmark price. The lowest benchmark Rs 1.18 lakh was set for Punjab, where the winning bid was Rs (-20, 996). While the lower benchmark indicated a relatively higher commercial potential, the winning bid amount indicated that with the infrastructure costs provided for, the winning bidder was not only willing to forgo subsidy but also willing to pay the government Rs 20,996 annually per site. A maximum subsidy of Rs 1.6 lakh was sought in Mizoram from a benchmark price of Rs 3.2 lakh bringing in a reduction of 50 per cent. The high subsidy amount could be attributed to the hilly terrain and low revenue potential. Bidders in two clusters in Karnataka and two clusters in Rajasthan sought the least subsidy of Rs (-21,020). These were against a benchmark of Rs 1.56 lakh and Rs 1.74 lakh in Karnataka bringing in a reduction of 112 per cent and 114 per cent respectively. In Rajasthan, the benchmark was Rs 1.53 lakh and Rs 1.74 lakh bringing in a reduction of 113 per cent and 114 per cent respectively.

For ten of the clusters, the bidding was over in the first round. This was because for these clusters, there were only three bidders in the first round. All three were considered 'successful' and the lowest subsidy sought among these bidders became the applicable winning bid price. Nine of these clusters sought subsidy from the government and included all the clusters in Arunachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, and Nagaland. The cluster in Tripura sought zero subsidy.

For fourteen of the clusters, the bidding went into the second round. For these clusters, one of the four bidders quoted more than zero and was not selected.

For fifty-seven of the clusters, the bidding went into the third round as more than three bidders quoted zero subsidies. This led to a tie, leading to a final third round, where the highest bidder was eliminated.

Bidders in clusters in sixteen states were willing to give money to government for getting the concession (that is, negative subsidy). These states were Andhra Pradesh, Assam, Bihar, Chattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. The bidders were ready to take no subsidy in clusters in states in Himachal Pradesh, Kerala, Rajasthan, Tripura, Uttaranchal, and Sikkim. Rajasthan was the only state where in some clusters the bidders were willing to get negative subsidy while in others some bidders asked for subsidy from the government.

Since only the lowest four bidders were allowed to go to the next round of bidding, it was important for bidders to come up with bids lower than the benchmark in order to continue to participate in the subsequent rounds. This resulted in zero or negative subsidy sought in the first round bids. Since only three bidders were to be selected, a further reduction in subsidy sought took place. For clusters in those states where negative subsidy was sought, the average reduction from the benchmark was 102.7 per cent (indicating the negative subsidy). For clusters in those states where zero subsidy was sought, the average reduction from the benchmark was 57.9 per cent. For clusters in those states where subsidy was sought, the average reduction from the benchmark was 50 per cent. The overall reduction in subsidy sought was 93.2 per cent.

The total amount of subsidy 'saved' being the difference in the benchmark and the winning bid over all the clusters was Rs 24 crore. This included the negative subsidy of Rs 2.97 crore (Table A 4.1.1).

LESSONS FROM THE AUCTION BIDDING MODEL

The USOF framework prior to December 2006, limited service providers to only fixed and fixed wireless technologies. Subsequent changes have considerably enhanced the scope of service provision by specifically including mobile and other new technologies. The DoT has worked out a mechanism for roll out and disbursals, that is worth emulating to provide other infrastructure services in the country. In case of telecom services, it is likely that there may be operational difficulties in actual service provision due to the dependence of service providers on infrastructure providers. Early resolution of interface issues related to IPs and USPs could provide credibility to the USOF and pave the way for faster roll-outs in rural areas. The bidding process showed that market forces can determine which projects really need subsidy and how much. In a competitive environment, small subsidies could give tremendous leverage.

While there are several elements in the design of the current USOF, such as bidding process, separation of infrastructure and services, identification of areas to be subsidized (cluster) that may be directly relevant, there may be areas where other design choices would need to be made. For example, while in the case of a telecom network, it is 'justified' for users of telecom services to provide for connectivity for non-commercial areas or customers, as there are positive network externalities when more users are there on the network, it may not be conceptually acceptable for users to fund non-users in other infrastructure sectors (for example, airlines).

The allocation of subsidy on a viability gap funding appears to have worked well. Multiple round auctions with criteria that maintained competition enabled significant reduction from the reserve or benchmark price and allowed for market discovery of prices. An auction design that enabled 'clustering of clusters' would work even better, as it would enable infrastructure service providers to leverage economies of scale and allow service providers to consolidate their operations. For example, BSNL won the infrastructure bid in sixty-three of the eighty-one clusters. A bid design that allowed bidders to consolidate the clusters could have led to higher bids.

This model shows the government's shifting focus from RTD to 'coverage': In the new USOF framework, the government's focus has changed from RTD as a measure of penetration to 'coverage' over a geographical area. The concept of coverage takes into account the potential for widespread usage of wireless technologies, especially mobile services in a rural context. It also provides for connectivity to those who visit rural areas. We hope that, in future, coverage parameters also should be reported by TRAI in addition to RTD.

ANNEXE

TABLE A4.1.1
Part B Round wise Bid Data

State/Cluster No	Sites	Bidders in the First Round	Bidders in the Second Round	Benchmark per Site	Reserve Price for Second Round of Financial Bidding	Winning Bid	Total Subsidy 'Saved'	Reduction in the Winning Bid with Respect to Benchmark
	No.	No.	No.	Rs	Rs	Rs	Rs	per cent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Clusters in which Winning Bidders sought Negative Subsidy from the Government								
Andhra Pradesh	581						–7,560	
1	96	6	4	142,734	0	–12	–1,152	100.0
2	93	6	4	121,608	0	–12	–1,116	100.0
3	98	6	4	119,072	0	–12	–1,176	100.0
4	101	6	4	136,068	0	–14	–1,414	100.0
5	99	6	4	127,998	0	–14	–1,386	100.0
6	94	6	4	123,044	0	–14	–1,316	100.0
Assam	90						–1,648,800	
8	90	4	4	185,224	–18,288	–18320	–1,648,800	109.9
Bihar	489						–59,904	
9	106	6	4	157,767	–100	–119	–12,614	100.1
10	89	6	4	176,717	–100	–125	–11,125	100.1
11	79	6	4	205,445	–100	–125	–9,875	100.1
12	117	6	4	183,607	–100	–120	–14,040	100.1
13	98	6	4	183,188	–100	–125	–12,250	100.1
Chhattisgarh	560						–6,873	
14	79	4	4	286,714	0	–14	–1,106	100.0
15	129	4	4	259,472	0	–11	–1,419	100.0
16	106	4	4	244,835	0	–13	–1,378	100.0
17	114	4	4	210,745	0	–11	–1,254	100.0
18	132	4	4	295,815	0	–13	–1,716	100.0
Gujarat	66						–792	
19	66	5	4	179,589	0	–12	–792	100.0
Haryana	14						–168	
20	14	5	4	131,577	0	–12	–168	100.0
Jharkhand	305						–5,273,952	
26	100	6	4	225,131	–17,292	–17,292	–1,729,200	107.7
27	89	5	4	247,455	–17,296	–17,296	–1,539,344	107.0
28	116	6	4	256,480	–17,288	–17,288	–2,005,408	106.7
Karnataka	427						–8,974,005	
29	106	5	4	208,268	–20,980	–21010	–2,227,060	110.1
30	95	5	4	184,955	–20,984	–21015	–1,996,425	111.4
31	127	5	4	174,252	–20,988	–21020	–2,669,540	112.1
32	99	5	4	156,432	–20,992	–21020	–2,080,980	113.4
Madhya Pradesh	985						–12,948	
34	92	4	4	200,172	0	–14	–1,288	100.0
35	127	4	4	234,124	0	–14	–1,778	100.0

Annexe 4.1.1 contd.

Annexe 4.1.1 contd.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
36	59	4	4	175,924	0	–13	–767	100.0
37	121	4	4	184,476	0	–14	–1,694	100.0
38	95	4	4	215,503	0	–14	–1,330	100.0
39	122	5	4	231,408	0	–14	–1,708	100.0
40	110	4	4	204,352	0	–11	–1,210	100.0
41	101	4	4	235,446	0	–13	–1,313	100.0
42	61	4	4	235,382	0	–13	–793	100.0
43	97	5	4	206,671	0	–11	–1,067	100.0
Maharashtra	1017						–12,533	
44	96	5	4	190,414	0	–11	–1,056	100.0
45	111	5	4	182,437	0	–12	–1,332	100.0
46	91	5	4	169,221	0	–13	–1,183	100.0
47	123	4	4	210,812	0	–11	–1,353	100.0
48	127	6	4	197,175	0	–14	–1,778	100.0
49	127	5	4	220,579	0	–11	–1,397	100.0
50	104	6	4	158,760	0	–13	–1,352	100.0
51	113	6	4	151,861	0	–14	–1,582	100.0
52	125	5	4	175,684	0	–12	–1,500	100.0
Orissa	432						–2,081,784	
57	118	6	4	221,397	–100	–100	–11,800	100.0
58	101	6	4	193,883	–20,284	–20,284	–2,048,684	110.5
59	97	5	4	167,292	–100	–100	–9,700	100.1
60	116	4	4	238,573	–100	–100	–11,600	100.0
Punjab	13						–272,948	
61	13	4	4	117,963	–20,996	–20,996	–272,948	117.8
Rajasthan	294						–6,179,365	
63	97	5	4	162,713	–20,992	–21,020	–2,038,940	112.9
64	103	6	4	130,139	–20992	–21,015	–2,164,545	116.1
65	94	5	4	152,856	–20,988	–21,020	–1,975,880	113.8
Tamil Nadu	371						–46,017	
67	107	6	4	134,668	–100	–125	–13,375	100.1
68	100	6	4	137,140	–100	–124	–12,400	100.1
69	86	5	4	138,029	–100	–122	–10,492	100.1
70	78	6	4	137,062	–100	–125	–9,750	100.1
Uttar Pradesh	666						–5,130,689	
74	134	5	4	176,826	0	–13	–1,742	100.0
75	117	5	4	158,106	–20,888	–20,920	–2,447,640	113.2
76	126	6	4	185,271	0	–12	–1,512	100.0
77	128	5	4	194,630	–20,884	–20,920	–2,677,760	110.7
78	88	5	4	156,518	0	–14	–1,232	100.0
79	73	6	4	152,133	0	–11	–803	100.0
West Bengal	167						–2,416	
80	78	6	4	179,313	0	–15	–1,170	100.0
81	89	7	4	185,781	0	–14	–1,246	100.0
Total	6477						–29,710,754	102.7

Annexe 4.1.1 contd.

Annexe 4.1.1 contd.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Clusters in which Winning Bidders Sought Zero Subsidy from the Government								
Himachal Pradesh	295						28,388,542	
21	104	3	3	270,557	**	0	0	100.0
22	98	4	4	293,880	0	289,679	28,388,542	1.4
23	93	3	3	325,532	**	0	0	100.0
Kerala	46						0	
33	46	5	4	104,469	0	0	0	100.0
Rajasthan	117						25,388,883	
62	117	4	4	228,755	0	216,999	25,388,883	5.1
Sikkim	8						0	
66	8	4	4	188,840	0	0	0	100.0
Tripura	147						0	
71	147	3	3	228,500	**	0	0	100.0
Uttaranchal	217						36,527,134	
72	115	5	4	177,133	0	163,876	18,845,740	7.5
73	102	4	4	186,916	0	173,347	17,681,394	7.3
Total	830						90,304,559	57.9
Clusters in which Winning Bidders sought Subsidy from the Government								
Arunachal Pradesh	62						145,870	
7	62	3	3	291,741	**	145,870	9,043,940	50.0
Jammu & Kashmir	178						215,773	
24	88	3	3	202,576	**	101,288	8,913,344	50.0
25	90	3	3	228,971	**	114,485	10,303,650	50.0
Manipur	95						14,478,950	
53	95	3	3	304,820	**	152,410	14,478,950	50.0
Meghalaya	102						15,233,190	
54	102	3	3	298,690	**	149,345	15,233,190	50.0
Mizoram	71						11,342,818	
55	71	3	3	319,517	**	159,758	11,342,818	50.0
Nagaland	56						6,233,640	
56	56	3	3	222,631	**	111,315	6,233,640	50.0
Total	564						75,549,532	Average 50.0
Grand Total	7871						136,143,337	Average 93.2

Note: ** indicates, that second round bidding was not required.

Source: www.dot.gov.in and Authors' Analysis.

4.2
The Chhattisgarh Model of e-Government

Pradeep Varma

The term 'E-government' refers to the use of technology to enhance the access to and delivery of government services to benefit citizens, businesses, services, and employees. It also includes provision of services to citizens and businesses that are customer oriented and not provider oriented; where service delivery is independent of place and time and that provides a single interface to government. E-governance, on the other hand, is the application of Information-Technology in the processes of government functioning to bring about Simple, Moral, Accountable, Responsive, and Transparent (SMART) governance. In short, the aim of e-governance is to provide knowledge-based governance rather than person-centric governance. E-governance can be defined as giving citizens the choice of when and where they access government information and services. A delivery channel view is required to be able to put the citizen at the centre of government. Thus, 'e-government' is the mere delivery of government services and information to the public using electronic means whereas 'e-governance' allows direct participation of its constituents in government activities.

Having said that, it is imperative to note that for any Indian state to establish systems of e-government and subsequently those of e-governance, it would have to start in baby steps, keeping in mind the possible socio-economic implications at each stage. A clear roadmap would need to be drawn up at the outset, while lessons from each stage of implementation would provide inputs for suitably changing the future plans for smoother execution with better results. While e-governance projects have been attempted at the district level through models such as Lokvani, e-Seva and Gyandoot,[2] one may conjecture that district-wide models did not find spontaneous replication in other districts simply because other district administrations were not interested in taking the trouble. In this context the endeavour of the Chhattisgarh state deserves special mention as it attempts to establish a reign of e-governance state-wide. Being a state-wide model, it took a long time to plan and ensure e-readiness (connectivity, e-leadership, information security, and human capital formation) of the state but the pilot project is moving rapidly to the fourth stage of e-governance demonstrating its success.

IMPLEMENTATION OF THE CHHATTISGARH MODEL

Chhattisgarh, with a population of 18 million, covers 134,194 sq kms. The state has witnessed rapid expansion of telecom networks both in the public and private sector domains in recent years. The major telecom players in the state today include BSNL, Reliance Infocom, Bharti Telecom, and Tata Tele-services.

Despite the rapid proliferation of telecom communication networks in the state, the benefits of information technology are yet to reach a large number of people, especially in rural areas. The telecom density in Chhattisgarh is abysmal; lower than current 20 per 1000 national average. Similarly the PC penetration rate in the state is also extremely low. While there has been no systematic survey carried out for estimating PC penetration, a fair assumption would be that the state has penetration rates which are about the same as the national average.

In order to address the problem of the digital divide it is necessary to take action on three fronts. First, telecommunications infrastructure has to be put in place in order to provide affordable bandwidth for large sections of the community. Second, low cost information access appliances which are easy to master and use must be developed on a large scale for the rural population, to increase IT penetration rates. Third, content relevant to the lives of people needs to be developed and made available over networks. Any strategy for bridging the digital divide will necessarily have to contend with these three essential elements.

The government of Chhattisgarh developed an IT policy with the following key objectives:

- Access to information for all its citizens;
- Electronic governance and reengineering of government processes by effective deployment of information technology;
- Transparent, efficient, and quick decision-making within government administration;
- Increased IT literacy and creation of trained manpower;
- Attracting investment in IT related industries with attractive policies; and

[2] Kumar et al. (2007).

- Establishment of good information and communication infrastructure.

The government of Chhattisgarh has embarked upon state-wide automation of its operations and implementation of e-governance initiatives. Various departments of the government are in the process of developing and implementing software applications which will be hosted by the state data centre.

MAKING AVAILABLE STATE-WIDE AREA NETWORK USING PPP

As part of the e-government master plan, the government of Chhattisgarh intends to provide services on the internet to its citizens in a secure and controlled manner. These services must be consistently available and have the capacity to grow as requirements increase.

This has resulted in the need for a robust communications infrastructure that provides a medium for effective delivery of e-government services to citizens.

The State Wide Area Network (SWAN) will effectively and efficiently meet the requirements of Chhattisgarh for voice, video, and data communications, for a single centralized communications infrastructure.

Various departments in Chhattisgarh have separate applications pertaining to their specific usage and purpose for providing services to citizens. A typical government department using an e-governance application requires the following:

- A delivery platform for e-governance applications.
- A mechanism for fast internal communication.
- Increased access to citizens for services.
- Transfer of information between employees in different locations, allowing for the sharing of common files.
- Carriage of voice and data in an integrated manner rather than having separate networks for voice and data.
- A secure and reliable channel to transfer data across locations.

To fulfill these requirements, implementation of a SWAN is imperative. SWAN is expected to cater to the information communication requirements of the entire state government and its departments. Through SWAN, the Chhattisgarh government will ensure that every citizen in the state has access to government services and information whenever and wherever they need it. It will provide reliable, vertical, and horizontal connectivity within the state administration to make the government more productive. It will also enable government agencies to leverage a robust infrastructure to provide a complete array of government services and information; reduce communication cost; provide a secure backbone for encouraging electronic transactions; enable efficient service management and strengthen disaster management capacity. The government will make services available in a cost-efficient manner, offering public constituencies' equivalent access at an equivalent price, regardless of their location in the state and move toward the provisioning of converged communication services (voice, data, and video) up to block level and the interconnection and interoperation of network platforms and encouraging vendors to consider any network architecture to determine the most efficient and cost effective approach.

For implementation of SWAN, Chhattisgarh decided to adopt the build, own, operate and transfer (BOOT) model, and will be selecting an appropriate agency through a suitable competitive process for the establishment, operation, and maintenance of the network. The entire process of outsourcing, including advice on the most appropriate PPP model, is being managed in partnership with a consultancy organization under the direction of an implementation committee to be established by the state. End-to-end service availability on the SWAN and its independent monitoring are prime requirements for reliable, seamless networking across the state and to meet the objectives of this core e-governance infrastructure. Chhattisgarh, therefore, has proposed to enter into appropriate Service Level Agreements (SLAs) with the implementing agency and appoint an independent agency to monitor the performance with reference to the SLA and related aspects. Besides, for the communication network for e-governance to be complete, the state has put the land records management system and the CHOICE (Chhattisgarh Online Information for Citizen Empowerment) application on-line.

GIS AND LAND RECORDS MANAGEMENT SYSTEM

Land records are regularly updated as land is bought, sold, or acquired by the state government for various development activities. Manual procedures for updating land records and providing copies of the updated record took considerable time and the land owner had to make a number of visits to the concerned office to ensure that the records were properly updated to reflect his/her ownership.

The government of Chattisgarh has successfully piloted a GIS based Land Records Management System in the state to facilitate efficient storage, updation, and easy maintenance of land records. The web-enabled solution for land records piloted by the state offers remote access to records residing in the central server from different village locations. The distribution of copy of map and updation of land records from remote locations is an essential requirement of e-government solutions for land records.

Information technology has revolutionized map-keeping. GIS technology allows maps and data to be stored together and data communication networks facilitate access of maps and data from anywhere. Digitally generated land records are accessible to authorized users in kiosks from where citizens can obtain printouts for their own reference.

Land Records Management System (LRMs)

Digitalized maps offer more security than paper maps, and no individual can access, or modify them without proper authorization. All transactions (buying/selling/transferring of land or government acquisition for development projects) and logs are recorded and an audit trail is maintained. Hence, all transaction details are easy to retrieve in case of any dispute/ legal problems. All transactions are initiated by a lower level official (*INITIATOR*) and sent to the next level official (*EXAMINER*). The examiner views the transactions and sends to decision maker (*DECIDER*) for approval or rejection. The transactions at each level can be viewed and queried.

At each and every stage the transaction status can be tracked by the user with the transaction ID provided to him. Once the transaction is approved, land records including maps are updated, stored and reports generated.

CHOICE: AN e-GOVERNANCE APPLICATION

CHOICE is an acronym for **Ch**hattisgarh **O**nline **I**nformation for **C**itizen **E**mpowerment, a citizen services portal of the Government of Chhattisgarh. CHOICE is an e-governance initiative based on the objective of delivering government services and information to the citizen using electronic delivery channels. CHOICE business model is based on the equal participation of government officials and private players. CHOICE is a One Stop Window for citizen services, and is integrated with other government departments.

Phase 1 of CHOICE has been developed so as to create a robust application at the lowest cost. Most users are now familiar with browsers (like Internet Explorer or Netscape) and so, the CHOICE front-end is designed to be accessed using a browser. The application has been developed using non-proprietary technology so that it can be used from different types of computers (PCs to UNIX machines). The software architecture is modular so that each tier can be upgraded independently without the need to change the entire application. Through the service delivery mechanism created through CHOICE, more than 150 citizen services have been made available to citizens through the internet and designated access points (CHOICE centres) available in easily accessible locations. Some of these are (a) Birth Certificate, (b) Death Certificate, (c) Issue of Ration Cards, (d) Property Tax payment, (e) Issue of Trade License, (f) Application for Building Plan approval, (g) SC/ST Certificates, (h) OBC Certificates, (i) Issue of Arms Licence, (j) Indira Awas Yojna, (k) Credit-cum-subsidy for rural housing, (l) Electricity Bill Collection, (m) Telephone Bill collection, (n) Agent Registration and so on.

A key feature of this citizen service information network is the ability of the general public to obtain information that may not have been previously or easily accessible to them. Like most citizen service information networks, CHOICE offers a variety of information and communication resources that are relevant to the citizen. Among its many features, the system has the capability to allow citizens to query databases, request applications, and check the status of communication made to government departments. The key business processes in the system are registration, forwarding, approval, and certifying processes.

Registration Process

An applicant/candidate approaches a CHOICE Centre with necessary credentials where he/she requests for a Citizen Service. The CHOICE agent logs on to the CHOICE website using proper authentication details (User ID, password, biometric authentication) and enters details in the system based on the applicant's request using digital signatures. The normal CHOICE centre service charges are collected from the applicant. Before submitting the application, the application is displayed with a declaration statement from the applicant stating that the information furnished is correct to the best of his/her (the applicant's) knowledge. If any mistake is found, then the operator can again edit the respective fields. A printout of the filled-in application form along with the declaration is taken and signed by the applicant. An acknowledgement is printed and given to the applicant.

Forwarding Process

In the back-office (in the concerned department), the Forwarder logs on to the CHOICE website using proper authentication details (User ID, password, biometric authentication). The back office Forwarder views the application details and attachments as submitted by the CHOICE agent. If application details and attachments are proper, he forwards the application to the approving authority for approval. If application details are not found to be in order, he returns the application to the CHOICE agent with appropriate remarks.

Approval Process

The Approving Authority (Tahsildar, Health Officer) logs on to the CHOICE website and gets authenticated. The

officer concerned views all pending applications and can either approve or reject or keep the application as pending using his digital signature to authenticate his decision.

Certificate Printing Process

In this option, an applicant/candidate approaches a CHOICE Centre with the necessary credentials and requests for certificate printing. The CHOICE agent enters the required data (such as Applicant Name and Address). The system then searches and shows a list. In case the system fails to locate any record, a non-availability statement is printed and the applicant has to pay a small fee . In case the system finds the record it will show the certificate which can then be printed and given to the applicant.

Multi-channel Delivery Mechanism

The system supports multiple delivery channels like internet, SMS, Interactive Voice Response, mobile phones, landline phones, and information kiosks.

Considering the literacy levels of the citizens, as well as their low levels of familiarity with computers, CHOICE has been designed to be operated through intermediaries called CHOICE agents posted in kiosks called CHOICE Centres. Each kiosk agent has been registered in the state server with user name, password, biometric thumb impression, and class (iii) digital signature (created in a smart card).

Each kiosk agent is required to operate an account with a designated bank. On payment for a service by a citizen to a kiosk agent, the state server attempts to check the balance available in his account with the bank. If sufficient balance is available, the transaction is allowed, otherwise the transaction is denied. The bank has to allow '*web transactions*' from the state server for debit of the kiosk agent's account and simultaneous credit of the respective utility account. The kiosk agent collects cash from the citizen against services rendered and deposits the cash in his account with the designated bank. Periodic statements of transactions are forwarded to the bank, utilities, and kiosk agents through e-mail as required by them for reconciliation.

PUBLIC AND COMMUNITY PARTICIPATION

An interesting feature that is emerging in the locations where CHOICE has been piloted is the active participation of the community in its implementation and usage. CHOICE agents are becoming nodal points in the community, with citizens approaching the CHOICE centre for services other than those offered through the CHOICE application itself, and CHOICE agents are taking on an entrepreneurial role. For example, certain CHOICE agents have begun contacting all the hospitals and nursing homes in the area that they serve to find out information about births that have taken place in the previous 24 hours. With this data in hand, they then approach the new parents and offer them services such as making a horoscope for the new-born child, and even the services of a '*pundit*' for various ceremonies. (Of course, the agent has a back-to-back arrangement with the providers of all these services). Such entrepreneurial activities lead to an increase in the registration of new births.

Again, since the agent gets paid a fee for every electricity bill collected by him, he sends out monthly reminders to subscribers in his area of service, and follows up with them to ensure they pay their bill on time. The utility thus increases collections. Many such examples can be witnessed as the roll-out of CHOICE continues.

PILOT PROJECTS

Both the Land-Records management system and CHOICE (the service delivery application) are currently in an advanced stage of pilot implementation. The statewide telecom and data-com infrastructure will be enabled when the CG-SWAN project is rolled out. The specification definition for CG-SWAN is currently on-going and will be followed by the bidding process.

Two committees have been set up to ensure that stakeholder interests are protected at all times, and to monitor the effective implementation of the e-governance application. These are the *Project Directing Committee* and *the Project Steering Committee*. The Project Directing Committee is headed by District Collector and the Project Steering committee is headed by the Secretary Urban Administration. All the stakeholder departments such as Panchayat, Education, and so on have their representatives in these committees. Even the agents are invited in the meetings of these committees for their feedback.

The main functions of the committee chaired by the district collectors include:

- Coordinating various activities between government departments/agencies/bodies, implementing agents and other stakeholders in the project.
- Reviewing progress of utilization of services by various departments.
- Issuing orders etc for effective implementation where required and appoint agents.
- Monitoring the performance of centres through MIS reports/other mechanism and issue periodic guidelines/instructions on the same.
- Ensuring a fair and transparent system at centres including handling of cash, sharing of revenue, display of services with rate list and so on.

- Taking up any other issue pertaining to implementation of the e-governance application in the respective districts.

The main functions of the state Project Steering Committee include:

- Monitoring the implementation and usage of e-governance services.
- Taking necessary decisions with regard to effective implementation of these services.
- Deciding on time frames for change-over from manual to automated provision of each service.
- Devising new services that are to be implemented under the e-governance project.
- Coordinating between various stakeholders at the state level.

There is also a technical committee with a brief to keep abreast of new and emerging technologies and recommend the roadmap for ushering them in appropriately. The e-governance application at present is undergoing a city-wide pilot at Raipur, the capital of Chhattisgarh. It is being subjected to a rigorous quality assessment conducted by a team under the aegis of IIT Kanpur. A report has been submitted and it is expected that CHIPS (Chhattisgarh Infotech and Biotech Promotion Society), the nodal IT Agency of the Government of Chattisgarh will ensure that the recommendations made in the report in terms of changes required will be implemented by the company contracted with the software development.

In short, e-governance allows direct participation of its constituents in government activities; the initiatives taken in Chattisgarh, CHOICE and LRMS, as well as other applications on the anvil allow the citizens to participate actively in the process of governance.

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