



**Report of the Technical Group
to Provide Technical Specifications
for Electronic Handheld Device
for SRS Field Data Collection**



**OFFICE OF THE REGISTRAR GENERAL, INDIA
MINISTRY OF HOME AFFAIRS
GOVERNMENT OF INDIA
NEW DELHI**

CONTENTS

		Page No.
1	Background	3
2	Basic Objectives	3
3	The First Attempt	4
4	Constitution of Technical Committee	4
5	Handheld Devices Surveyed	6
6	The Recommendations	7-10
Annexure-1	Office Memorandum – Constitution of Technical Committee to provide technical specifications for electronic handheld device	11-12
Annexure-2	Technical specification of some of the handheld devices	13-15

Background

The Sample Registration System (SRS) is a large-scale demographic survey for providing reliable annual estimates of birth rate, death rate and other fertility & mortality indicators at the national and sub-national levels. It was initiated on a pilot basis in a few selected States in 1964-65 and was extended to all States during 1969-70 with about 3700 sample units. The SRS is based on a dual record system. The field investigation consists, firstly of continuous enumeration of births and deaths in selected sample units by resident part time enumerators, generally anganwadi workers & teachers. Subsequently, an independent retrospective survey is conducted after every six months by SRS supervisors. The data obtained by these two independent functionaries are matched. The unmatched and partially matched events are re-verified in the field and thereafter an unduplicated count of births and deaths is obtained. The sample unit in rural areas is a village or a segment of it, if the village population is 2000 or more. In urban areas, the sampling unit is a census enumeration block with population ranging from 750 to 1000.

2. The SRS sampling frame undergoes revision every ten years, based on the results of the latest census. For a wider representation of the population, factors such as modifications in the sampling design, existing limitations of the scheme, additional requirements, etc. are taken into account at each replacement of the sample. The first replacement of SRS sample was effected in 1977-78 and, the latest, in 2004. The present, SRS sample consist of 7,597 sample units (4,433 rural and 3,164 urban) spread across all States and Union territories and covers about 1.3 million households and 6.93 million population. The Field work of the survey is carried out on a half yearly basis by about 800 field functionaries (SRS Supervisors) of the ORGI and continuous enumeration on monthly basis by about 7600 Part Time Enumerators.

Basic Objectives

3. To introduce electronic handheld device for capturing SRS field data by the Supervisor during retrospective half-yearly surveys with a view to:

- up-date the House list, Household schedule and the list of women in the reproductive age group along with their pregnancy status;
- record births and deaths which occurred during the half-year under reference;
- Match the events recorded during continuous enumeration and those listed in course of half- yearly survey;
- Re-verify the unmatched and partially matched events; and
- Generate the unit level tables.

This would result in

- reduction of error while collection of data;
- creation an electronic data base; and
- faster processing and quicker dissemination of results

4. Accordingly, a provision was made in the 11th Five Year Plan to procure 800 such handheld devices over a period of three years and for development of suitable data collection software for the same.

The First Attempt

5. M/s Bharat Electronics Limited (BEL) offered and prepared data collection software to capture the field data through the handheld device called 'Simputer'. A pilot test was carried out in February 2007 in two SRS sample units (one urban and one rural) located in Bangalore to test the software and the machine. The results of the pilot were, however, not encouraging. Small screen size of the device, poor display in sunlight, difficulty faced by SRS supervisors in use of the virtual key-board and problems in the data collection software come out to be the major limitations.

Constitution of Technical Committee

6. Based on the experience of the pilot test, it was felt that it would be necessary to precisely identify a handheld device that would best suit the SRS field data collection. Accordingly, the Ministry of Home Affairs, Government of India vide Office Memorandum No. 2/10/2006-VS(SRS) dated 13th September, 2007 constituted a Technical Committee under the

Chairmanship of Dr. H. K. Suhas, Deputy Director General (National Informatics Centre) to provide technical specifications of the handheld device (Annex-1). The terms of reference of the Committee were as under:

- i) Survey all the available handheld devices w.r.t. memory size, screen size, storage, hours of battery backup and overall weight, ability to transfer data through USB/Ethernet support,
- ii) Associated software for data collection and transfer of data from handheld device to the server and vice-a-versa,
- iii) Evaluate various options in respect of devices and device neutral multilingual software,
- iv) Recommend the device, separately for rural and urban areas and the solution for carrying out the survey, and
- v) Examine the data communication features viz. GPS, CDMA, etc. (Optional)

The Committee was to submit its report within a period of two months from the date of the first meeting.

7. The first meeting of the Technical Committee was held on 19.09.2007. The requirement of handheld device for SRS field data collection and the SRS system were explained to the members. It was decided that an 'Application Software' be attempted in the first instance to get a reasonably good idea of the requirements. Technical specifications of the device can then be worked out suitably thereafter. Both M/s HP and M/s Encore Limited (Bangalore) agreed to attempt an 'Application Software' for SRS and make a presentation before the Committee within a month's time.

8. The second meeting of the Committee was held on 18.10.2007. The meeting was attended by Addl. Secretary and RGI, M/o Home Affairs and DG (NIC), M/o Information Technology. M/s HP and M/s Encore Limited (Bangalore) displayed the applications developed using one of the SRS field forms on their device. However, for development of complete data collection software it was decided to approach NICS. Accordingly, NICS was

approached who are in the process of identifying a suitable software developer. In the course of the pre-bid meeting, hardware component of the device was also discussed. It was felt that the identified device should be rugged to be able to cope up with the varied field conditions across the country. Looking into the fact that the average age of SRS Supervisors is high currently and the findings of the field test carried out at Bangalore using 'Simputers', it was felt that a minimum screen size of 7 inches would be essentially required. Besides, a good visibility in sunlight would also be essential. The SRS Supervisor is required to undertake field work of three sample units in one go in each HYS. Since the field work involves updating of the information collected at the previous HYS, minimum storage capacity of 2 GB would be necessary. Moreover, as the supervisor during a day updates/collect information from about 45 households i.e. of 120 to 150 members, he has to be in the field for about 6-8 hours. Accordingly, a battery life of 6-8 hours would be essentially required. Since the supervisor is required to carry it personally, the device has to be light in weight.

9. The time period for submission of Report by the Technical Committee was up to 18.11.2007. In view of the Committee's decision to first attempt an 'Application Software', the time limit for submission of Report was extended up to 28th February, 2008.

Handheld Devices Surveyed

10. A Technical Conference was organized during 3rd and 4th December 2007 by the Office of the Registrar General, India in collaboration with the UNICEF, USAID and UNFPA, wherein one technical session was dedicated to the electronic capture, transmission, processing and dissemination of Census Data. The session was attended by most of the members of the Technical Committee. During the session, a presentation was made by M/s Reliance Communications on their recently launched handheld device viz. 'XO'. The machine has features such as multi lingual capabilities, camera, multiple connectivity options, low power consumption, etc. The specification details of the device along with that of some of the other devices displayed are given at Annex-2.

Recommendations

11. The third meeting of the Committee was held on 4th February, 2008 which was attended by Addl. Secy. and RGI, M/o Home Affairs and DG (NIC), M/o Information Technology also, to arrive at an early consensus in finalization of the specifications. The draft recommendations prepared by Dr. H.K Suhas, Mr. S. Sen and Prof. Rajat Mona were discussed item wise. The details are as under:

- (a) Size of Screen: It was discussed that 7" screen size for the HHD is suitable, keeping in view its weight, user friendliness in the field; and readability in sunlight.
- (b) Memory: RAM minimum 512 MB is minimum requirement for running the latest software with speed.
- (c) Storage: Minimum 2 GB Flash is required for loading data of 4 SRS unit's consisting of 3600 family members for two half yearly surveys , no spindle drives are required to save energy of the battery.
- (d) Interface: 3 USB Ports are suggested to have a mechanism of connecting a variety of devices such as Pen drive, Finger Print reader, Camera or a GPS device or a signing pad or any other device, as the requirement for all these would become a reality with the passage of time.
- (e) Camera: Integrated color video camera, minimum 640x480 resolution is essential for retaining the photo of respondent as a proof. The cost of camera is between Rs.1000 to Rs.1500.
- (f) Casing must be rugged (dust proof and water proof) to operate in rural environment.
- (g) Must have external/built in satellite-based GPS with resolution better than 25 meter for taking geographical coordinates of the habitat.
- (h) Security features: Malware protection, Password protection, Digital Signature interface; PKCS compliant, PKI & symmetric key base cryptography (3DES and AES) are security features required for software/hardware protection from virus and malware and data loss/theft while connecting to other

peripherals. Such requirements can be met through programming at minimum cost.

- (i) To work on JAVA Environment: Must be bundled with JAVA Environment for Mobile Computing and also must be loaded with JDBC drivers. It was justified that choosing JAVA environment is that the e-Governance, Census and other activities related to planning are essentially social activities and therefore there is a need to hold on to open Technologies rather than get tied up with proprietary solutions which would be a drain on the scarce and precious resources
- (j) Java Environment must support Java Cryptographic API, display of all Indian Language scripts
- (k) Key Boards must be enabled for Indian Language: Assamese, Devanagiri, Tamil, Malyalam, Kannada, Telugu, Bengali, Gujarati, Gurmukhi, Marathi and Oriya. Character set should be Unicode, so that it can be used anywhere in India.
- (l) Battery Backup: Batteries must last for at least 6 hours of operation (as per the decision of the second meeting).
- (m) Connectivity: Inbuilt Wi-Fi/WiMax/Mobile telephony facility (at least one of them) for Uploading / Downloading Data
- (n) Weight should be less than 1 Kg., excluding battery (as per the decision of the second meeting).

12. The Committee is of the view that the specifications recommended for the hand held device are suitable for all types of surveys including socio-economic surveys. For higher end use, such as multi-purpose identity cards, etc additional specifications suggested are the following:

- (i) Optical finger print reader/capture device, either built in or external to the USB with a compatible attachment
- (ii) Built in Mike and Speakers
- (iii) Web browser suitable for HHD

13. The Technical specifications of the handheld device are recommended by the Committee as under:

- (i) Size of Screen: Minimum 17.8 cm.(7 inches); Display Must be readable in sunlight
- (ii) Memory: RAM minimum 512 MB
- (iii) Storage: Minimum 2 GB Flash, no spindle drives
- (iv) Interface: USB Ports at least 3
- (v) Camera: Integrated color video camera, minimum 640x480 resolution
- (vi) Casing must be rugged (dust proof and water proof) to operate in rural environment
- (vii) Must have external/built-in satellite-based GPS with resolution better than 25 meter for taking geographical coordinates of the habitat.
- (viii) Security features: Malware protection, Password protection, Digital Signature interface; PKCS compliant, PKI & symmetric key base cryptography (3DES and AES)
- (ix) To work on JAVA Environment: Must be bundled with JAVA Environment for Mobile Computing and also must be loaded with JDBC drivers Java Environment must support Java Cryptographic API, display of all Indian Language scripts
- (x) Key Boards must be enabled for Indian Language: Asamese, Devanagiri, Tamil, Malyalam, Kannada, Telugu, Bengali, Gujarati, Gurmukhi, Marathi and Oriya. Character set should be Unicode
- (xi) Battery Backup: Batteries must last for at least 6 hours of operation
- (xii) Connectivity: Inbuilt Wi-Fi/WiMax/Mobile telephony facility (at least one of them) for Uploading / Downloading Data
- (xiii) Weight should be less than 1 Kg. (excluding battery)

14. The other desirable features in the higher end device recommended are as under :

- (xiv) Optical finger print reader/capture device, either built in or external to the USB with a compatible attachment
- (xv) Built in Mike and Speakers
- (xvi) Web browser suitable for HHD

- o0o -

**No.2/10/2006-VS(SRS)
GOVERNMENT OF INDIA
MINISTRY OF HOME AFFAIRS
OFFICE OF THE REGISTRAR GENERAL, INDIA**

V.S. Division, West Block-1,
R.K.Puram, New Delhi-110066
Dated:13 September, 2007

OFFICE MEMORANDUM

It has been decided to capture field data from the Sample Registration System (SRS) – the largest demographic sample survey in the world, using hand held device. This will not only be useful for creating an electronic database but will also reduce the time lag between collection of data and release of results. To provide technical specifications for the electronic handheld device, the Ministry of Home Affairs, Government of India has constituted a Technical Committee with the following composition:

- | | | |
|---------|---|------------------|
| (1) | Dr. H.K. Suhas,
DDG, NIC
New Delhi | Chairman |
| (2) | Prof. Rajat Moona,
Deptt. of Computer Science & Engineering
IIT, Kanpur | Member |
| (3) | Shri R.C. Sethi
Additional Registrar General
Office of the Registrar General, India (ORGI) | Member |
| (4)-(6) | Manufacturers' Association for
Information Technology (MAIT)
4 th Floor, PHD House,
Opp. Asian Games Village,
New Delhi-110016 | Three Members |
| (7) | Shri S. Sen
Technical Director
National Informatics Centre
New Delhi | Member |
| (8) | Shri B.M.L. Jain
Additional Director (EDP), ORGI | Member |
| (9) | Shri Mohan Singh Thapa
Joint Director (EDP), ORGI | Member |
| (10) | Shri Sunil Jain
Deputy Registrar General (SRS) | Member-Secretary |

2. The Terms of Reference of the Committee will be as follows:
 - i) Survey all the available hand held devices w.r.t. memory size, screen size, storage, hours of battery backup and overall weight, ability to transfer data through USB/Ethernet support,
 - ii) Associated software for data collection and transfer of data from hand held device to the server and vice-a-versa,
 - iii) Evaluate various options in respect of devices and device neutral multilingual software,
 - iv) Recommend the device, separately for urban and rural areas and the solution for carrying out the survey, and
 - v) Examine the data communication features viz. GPS, CDMA, etc. (optionally)
3. The TAC may co-opt members, if considered necessary.
4. The Committee will submit its Report to the government within a period of two months from the date of its first meeting.
5. TA/DA for attending the meeting in respect of member at Sl.No.2, being a non official will be borne by the Office of the Registrar General, India, as applicable to Grade-I Officers of the Government of India. The TA/DA of official members of the committee would be reimbursed by the organization from which they were drawing their salary.
6. The participation of members from industry will be at their own cost.

Sd/-
(Sunil Jain)
Deputy Registrar General (SRS)

Copy to:

1. All Members of the Group
2. PS to AS(RGI)
3. PS to DG(NIC)
4. PS to Addl. (RGI)
5. Deputy Director (Headquarters), ORGI

Sd/-
(Sunil Jain)
Deputy Registrar General (SRS)

Specifications of some of the handheld devices

1. Mobilis

Form Factor: Mobilis Tablet
CPU: Intel PXA-255 @ 400MHz
Memory: 128 MB, Non-volatile Storage (inbuilt): 128MB - 2 GB Flash
Display: 7.0" TFT LCD 800x480 pixels; 16 bit color
Input: Touch tablet overlay; Integrated keyboard; Optional external USB Keyboard & mouse
Multimedia: Audio Codec with Integrated Speaker & Mic Video Player, VLC Support
Connectivity Options(built-in): WiFi; GPRS Modem; V.90 Modem RS232C; USB slave x 1; USB Host x2; 10/100 Ethernet
External Connectivity Options: Supports external GPRS/CDMA phone
Other Peripherals: MMC Card Slot SmartCard reader/writer
Batteries: Li-ion 24.4 WH
System Software: Linux Kernel 2.4, X11, Windows manager

2. “XO”

Processor & core system:

AMD LX700 CPU (433 MHz) with integrated Graphics Processing Unit
AMD CS5536 Companion chip for peripheral I/O
256 MByte DDR SDRAM system memory chip, running at 333MHz
Embedded controller for system monitoring
ISA Compatibility: Support for both the MMX and 3DNow! X86 instruction-set extensions

Storage:

1 GB of NAND Flash memory on motherboard
1 MB of serial Flash memory provided separately for firmware

Audio:

AC'97 audio subsystem, Internal stereo speakers and amplifier, Internal mono. microphone
Jack for external stereo headphone, Jack for external mono. microphone, sensor, or switch

Display: 7.5in (19 cm) color/monochrome dual mode TFT LCD, 1200x900 (200dpi)

Viewing area: 152.4 mm x 114.3 mm; 6 in x 4.5 in

Camera module:

Integrated color video camera 640 x 480 resolution, Full frame rate (30fps)

Wireless Networking:

Integrated IEEE 802.11/b/g (2.4 GHz) wireless networking interface
Mesh networking (variant of 802.11s) supported, Capable of mesh operation when CPU is powered down, Dual antennas integrated into laptop

Expansion Ports: Three external USB 2.0 ports provided

Input Devices:

Water and dust proof 80+ key rubber keyboard, with 1mm stroke, Capacitive touchpad used for pointing device, Resistive touchpad used for stylus input

Battery Pack: 5 serial Ni-MH AF type batteries with integrated gas gauge IC

2 or 4 serial LiFePO4 AF type batteries with integrated gas gauge IC

Safety: UL 1642 qualified (in process)

Weight: Less than 1.5 KG Size: 245mm (9.65")_ 230mm(9")_ 30mm(1.2")

3. Intel powered classmate PC

System Configuration: Hardware

Processor: Intel® Mobile Processor ULV 900 MHz, Zero L2 cache, 400 MHz FSB

Memory: DDR-II 256M SO-DIMM

LCD - 7" 800 x 480, LVDS Interface, LED B/L

Storage Device: 1GB/2GB NAND Flash

Audio Stereo 2 Channel Audio, Built-in Speakers and Microphone, Jack for External Output and Microphone Input

LAN/WLAN10/100M Ethernet + WLAN 802.11 b/g w/ Antenna

Keyboard : Integrated Keyboard with Hot Keys

Touch Pad : Cycle Touch Pad with Left and Right Buttons

Digital Pen (optional): Wireless Pen to take digital notes, TPM: TPM1.2

Power Solution: Battery with Adapter – 6 Cells, approximately 4 hours Usage

Weight: Less than 1.3kg (aprox. 2.86 pounds)

Operating System: Windows XP Pro*/ Linux*

4. HP iPAQ 612 Series Business Navigator

Wireless: Integrated Quad band GSM/GPRS/EDGE, Tri Band HSPDA 1,2,4,

Integrated WiFi – 802.11 b/g with WPA2 security

Integrated Bluetooth® v2.0 with EDR

Integrated GPS navigation (Assisted GPS)

Operating system: Microsoft Windows Mobile 6 Professional,

Mobile Microsoft programs included: Office Mobile, Office Outlook Mobile,

Processor: Marvell PXA270 Processor 520 MHz

Display: 2.8-inch transmissive TFT 65,000 color 240 x 320 pixel touch panel display with LED backlight

Memory: 128 MB SDRAM main memory for running applications 256 MB flash ROM

Dimensions: 117 x 60.3 x 17.5mm (4.6 x 2.37 x 0.69 in)

Weight (with battery): 145g (5.1 oz)

Power: 1590 mAh Lithium Polymer rechargeable, user changeable battery

Interfaces: USB 2.0 client for sync/data/charge, 64-bit Micro SD card slot

Audio: Integrated microphone, receiver, speaker and stereo headphone jack

Camera: 3 Megapixel, autofocus, 4X digital zoom, Image file formats: GIF, JPEG, BMP,

5. HP iPAQ 200 Series Enterprise Handheld

Wireless: Integrated Wireless LAN: IEEE 802.11b/g with WEP through WPA2-Enterprise (EAP-TLS and PEAP) and WiFi Multimedia, Integrated Bluetooth® v2.0 with EDR

Operating system: Microsoft® Windows Mobile® 6 Classic, Microsoft programs included:

Office Mobile, Office Outlook® Mobile, Internet Explorer Mobile, Windows Media Player Mobile

Processor: Marvell PXA310, 624MHz

Display: 4-inch transreflective TFT 260K color 480 x 640 pixel (VGA) touch panel display with LED backlight

Memory: 128 MB SDRAM main memory for running applications, 256 MB flash ROM

Weight (with battery): Up to 192g (6.8 oz)

Power: 2200 mAh Lithium Ion rechargeable, user changeable battery

Interfaces: 24 pin connector, mini USB, SDIO, CF (Compact Flash)

Audio: Integrated microphone, receiver, two speakers, 3.5mm 4 pin headphone jack

6. HCL MiLeap –X Series

Processor: Intel Celeron M Processor (900 Mhz)

Operating System: Linux Operating System

Chipset: Intel 915 GMS Chipset

RAM: 512 MB DDR2

Display: 7”(17.7 cm) wide (800x480)TFT LCD

Storage: 2 GB Solid State Storage Drive

Battery: 6 Cell with 4 Hrs Idle Condition

Weight: 1.44 Kg.

More Features: DC-IN, Headphone, Mic-in, Built-in-Mic, RJ-45, SD Card Slot, LAN Port, WiFi B/G, 2xUSB ver 2.0, 2 In-built Speakers.

7. HCL MiLeap –Y Series

Processor: Intel Processor A110 (800 Mhz)

Operating System: Genuine Windows Vista Home premium

Chipset: Intel 945 GU Express Chipset

RAM: 1x1 GB DDR2

Display: 7”(17.7 cm) wide (1024x600) LED Back Light w/z Touch Screen Panel, Swivel

Input Devices: On-Screen Launch Buttons, Stylus Pen, Touch pad

Storage: 80 GB Hard Disk Drive

Battery: 3 Cell with 3 Hrs Idle Condition

Weight: 980 Grams