

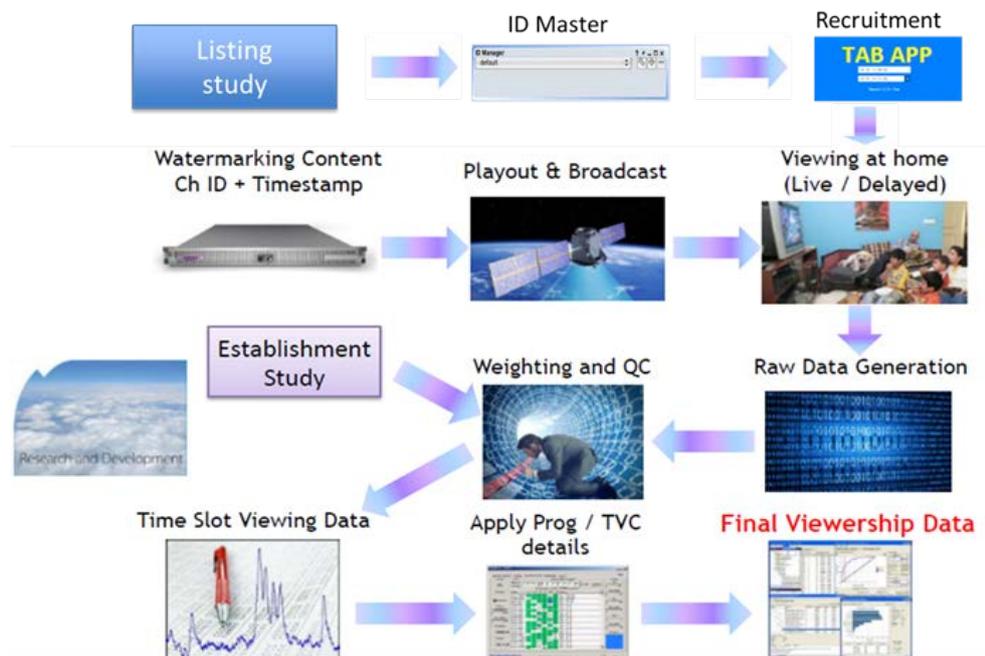
Television Audience Measurement - Description of Methodology

Overview

The entire BARC India process can be broadly bucketed as follows:

- **Establishment Survey** - A research study used to gather specific details of households and individuals to be used together with Census data in the preparation of universe estimates for TV audience characteristics – geographic, demographic, socio-economic status, etc. The Establishment Survey also serves as a randomly selected pool of TV owning households for use in the ongoing selection and recruitment of panel households
- **Panel Locations & Identification** - Identification of a specific sample locations
- **Panel Selection and Training**- Selection, recruitment, meter installation & training of household members
- **Panel Management**- Supervision of panel operations with strict adherence to established standards
- **Measurement and Viewing Data Capture**- Watermarking and BAR-O-Meter Technology used to identify & capture TV viewing events
- **Processing, Audience Estimation and Reporting**- Process of error checking, editing, validating, weighting, projecting to universe and delivering audience estimates to BARC India clients in a form suitable for reporting, analysis and commercial use
- **BARC India Media Workstation (BMW)**- BARC's desktop software application used to report and analyse audience data in the format required by individual customer segments

Given below is the overview of the high level process flow:



Establishment Survey/Universes- Target Population / Coverage, Sample Size and Sample Selection

The Establishment Survey used initially by BARC India was a research study conducted by a research agency across India, covering 235,000 households. The study was used in combination with Census to estimate the TV population of households and individuals, their location, demographic distribution and socio-economic status. To ensure credibility of the survey respondent data, the Research Agency performed ground quality checks, telephonic checks and real time workforce tracking checks. The information collected from each survey respondent included the household head's name, family member demographics, socio-economic classification and physical address.

Based on statistical experience, the average success/response rate of panel recruitment is approximately 10%. Based upon this, since BARC India needed to recruit and install a panel of 22,000 TV households, it was expected that a minimum of 220,000 TV households would be required from the Establishment Survey. However, the Establishment Survey performed by the Research Agency only produced 156,000 completed interviews with TV owning households (urban and rural). These 156,000 TV owning households became a part of the sample pool for recruitment of the BARC India panel, leaving a deficit of 64,000 TV owning household addresses to complete recruitment of the total panel of 22,000 TV HHs. To acquire additional sample locations/addresses for the remaining houses in geographic areas where the sample size was low and falling short based on the determinant variables, BARC India appointed another agency to identify additional TV owning HH addresses for panel recruitment. This supplemental study was called the Listing Study. As with the original study, quality checks were conducted on the Listing Study to ensure quality of data. A total of 92,000 HHs locations were produced by the Listing Study.

For both studies the primary variables considered for representation of the TV universe are the State, Town Class location of the household and the household's socio-economic status as determined by the New Consumer Classification System (NCCS), an industry agreed upon standard. Secondary variables such as gender, mother tongue, individual education, HH size, mode of signal reception, etc. are also considered. With respect to TV signal reception, BARC India covers all modes of TV signal reception in its panel.

The establishment study will be an annual exercise. The second establishment study is already under way and covers 300,000 households across India. The targeted household sample for subsequent studies will be between 300,000 to 350,000 households.

With respect to the NCCS classification of a household it is based on two main variables:

1. Education of the household's chief wage earner, defined as the person who contributes the most to payment of household expenses.
2. Household ownership of 11 specific durable goods. The 11 durables collectively owned by household members and considered in the NCCS classification of households in India are as follows:
 - a. Electricity Connection
 - b. Ceiling Fan
 - c. LPG Stove
 - d. Two Wheeler
 - e. Colour TV
 - f. Refrigerator
 - g. Washing Machine
 - h. Personal Computer/ Laptop
 - i. Car/Jeep/Van
 - j. Air Conditioner
 - k. Agricultural Land

There are 12 grades in the NCCS - A1, A2, A3, B1, B2, C1, C2, D1, D2, E1, E2, and E3. The table below shows the various NCCS categories, where A1 represents the highest class and E3 being the lowest.

CWE Education	Illiterate	Illiterate but no formal schooling/ upto 4th	School 5th-9th	SSC/HSC	Some college but not Grad.	Grad./Post-grad Gen.	Grad./Post-Grad Prof.
No. of Durables	1	2, 3	4	5	6	7, 9	8, 10
None	E3	E2	E2	E2	E2	E1	D2
1	E2	E1	E1	E1	D2	D2	D2
2	E1	E1	D2	D2	D1	D1	D1
3	D2	D2	D1	D1	C2	C2	C2
4	D1	C2	C2	C1	C1	B2	B2
5	C2	C1	C1	B2	B1	B1	B1
6	C1	B2	B2	B1	A3	A3	A3
7	C1	B1	B1	A3	A3	A2	A2
8	B1	A3	A3	A3	A2	A2	A2
9+	B1	A3	A3	A2	A2	A1	A1

Universe and Universe Estimation

Using data obtained from the Establishment Survey, overlaid with information from Census 2011, TRAI data, NCAER data, etc., a total of 17 State groups were formed. Then, based on the relative contribution of each State to total India TV households, the 17 States Groups are classified as High, Medium/ & Low priority. For sample allocation purposes, these 17 State groups are further divided into 10 subgroups based on their HH populations as per Census 2011. These sub-groups are (1) Mega Cities (population 75L+), (2) 40-75L, (3) 10-40L, (4) 5-10L, (5) 2-5L, (6) 1-2L, (7) Below 1L Urban, (8) Villages above 5K, (9) Villages 2-5K, (10) Villages below 2K. All 89 (other than 6 Metros) towns above 5 lakhs Population as per Census 2011 were selected individually with the exception of Srinagar. Sample allocations for > 40-75L, 5-40L, 2-5L, and 1-2L & below 1L within a State Group are based on the town-class group which is further allocated to PPS (population proportionate sampling) among TV owning Households. The same rule is applied for Rural Above 5K, 2-5K & below 2K villages. The selection of actual Towns /Villages was performed by means of systematic random sampling after arranging available Towns / Villages in descending order basis their TV owning household populations.

The original sample allocation per state group/metro is based on RE concept. RE or the “Relative Error” concept is a type of statistical sampling error described as the deviation in percentage of the observed value from the actual/expected value from the selected sample. Based on learnings over the course of time, the RE methodology will be updated.

Since the sample for BARC India was based on RE concept and not allocated in direct proportion to the TV owning household populations, statistical weighting allocations are done to ensure proper representation of the sample to the Universe. A detailed calculation of (state) X (urban / rural) X (population class) X (Town Class) X (Age) X (Gender) X (NCCS) X mode of signal reception was used to select the BARC India sample. The 22,000 panel household sample is statistically representative of the entire country. To make the reporting sample representative of the Universe, weights are applied to the reporting sample in order to conform it to Universe proportions and convert household and individual panelist viewing events to Universe Estimates of TV viewing.

Profiling, Recruitment and Training

The field recruiter goes to the HHD (household) sample location assigned by BARC India Research, explains the purpose of the BARC India TV Measurement Service and then seeks consent from the chief wage earner and householder for registering with BARC India. If the HHD is eligible (i.e. no disqualifications basis media/research affiliations of HHD members, adequate GSM wireless signal strength, agreement to incentives provided by BARC India, confirmation of compliance) the field recruiter asks the householder to provide specific household and household member information via a standardized panel recruiting questionnaire administered by the recruiter using a computer tablet app. At the present time fieldwork for panel recruitment and ongoing maintenance is being outsourced by BARC India to two independent agencies, hereinafter called the Panel Management Agency (PMA).

An android software application “Recruitment Installation and Training Application” (RITA) has been developed for use in the mobile tablet device that each field recruiter carries with them for the purpose of electronically capturing HHD details and communicating these via the wireless cellular network directly to BARC India’s central office server. The RITA application has been further enhanced with the addition of a “Recruitment Installation Training and Maintenance Application” (RIMA). The combined RITA and RIMA

applications provide BARC India with a fully automated data collection process for use at all stages of the panel HH relationship.

Strict confidentiality is maintained at all steps of the panel recruitment, training and maintenance process. Ongoing hygiene checks are performed on PMA fieldwork by BARC India and its Quality Control and Analytics (DQA) partners.

Panel Churn Policy

A policy of systematically rotating panel homes is prescribed by BARC India policy, ensuring that panel secrecy is maintained, precluding long term panelist fatigue and allowing the installed panel sample of TV households to reflect changes that are occurring over time in the universe of TV households. Beginning with the second year, after the initial panel installation has been completed and the panel is firmly established, a four (4) year churn/forced turnover cycle is initiated. Under this procedure, the total India sample, including open clusters, is randomly divided into four exhaustive and unique replicates, each replicate representing 25% of all clusters in the current sample. Each forced churn sample replicate is assigned one of four consecutive 12 month periods (i.e. 4 replicates over 4 years equals the requisite 48 month sample replacement cycle) during which all panel households within that replicate will be de-installed and replaced with households randomly selected from a new replacement sample replicate. Ideally, every month approximate 2.0-2.1% of panelists will be replaced as a result of the normal and forced churn and sample replacement policy. After the initial 48 month period, the sample will be churned on a FIFO (First In-First Out) basis, ensuring adequate replacement before a household is churned out.

To ensure the reporting sample will not suffer from forced churn, replacement sample households are selected, trained and monitored for a minimum period of two weeks after which the replacement household is activated and the original household is de-installed. To respect privacy concerns of panel households, the maintenance supervisors hired by the PMA are assigned responsibility for a specific group of individual panel households. Earlier in the development of the BARC India panel, different PMA personnel would visit a household for recruiting, installation, training and maintenance purposes. This practice made it difficult for BARC India or PMA management to assign accountability in situations where multiple field recruiters were visiting the same panel home. In the current situation, the PMA hires Maintenance Supervisors (MS) across its office locations and assigns each MS with responsibility for a specific group of BARC India sample locations. Each MS is responsible for recruiting, installing, training and maintaining the panel relationship with their assigned sample locations, ensuring proper compliance and provisioning BARC India with household and household member TV viewing data.

Panelist training and compliance maintenance are priority issues for the PMA. Pursuant to BARC India policy, those households that exhibit substandard compliance, when compared to BARC India standards, are retrained. If, after retraining, a household continues to underperform, it will be churned out of the panel.

The training protocol specifies two post installation training visits. The first visit is generally made 3-5 days post installation and includes training the HHDs in persons viewing button pressing, observing the working condition of equipment, verifying that the user manual is provided and available for use, etc. The second visit, generally made 10-12 days post installation, includes coincidental checks – whether TV is ON or OFF, channel viewed and persons viewing with retraining as needed in button pressing and confirming that family member button assignments are correct. The RITA and RIMA applications also have a pre-loaded training module for this purpose.

Panel Maintenance and Compliance

The viewing behaviour of panel homes is reported to BARC India on a daily basis. The BARC India validation process analyzes household and individual viewership behaviors, highlighting behaviors considered to be outliers (at individual/household level). Based upon validation results, Research asks the PMA to perform coincidental checks on these homes either telephonically or physically. Certain suspicious outliers are also checked directly by BARC India – bypassing the PMA. BARC India also involves a separate vigilance agency to check on outliers that it considers highly suspicious. Non-compliance is categorised as behavioural issue of the household or a technical issue with the meter. Any discrepancy in information is noted at this stage. If it is a behavioural issue, the household is then re-trained. If non-compliance continues, then the panel home is dropped. If there is a technical issue with the meter, then the issue is resolved by the BARC India field and technical teams and, where needed, raised with Médiamétrie, the technology provider for the BARC BAR-O-Meter.

Viewing Data Capture - Watermark Technology

TV usage measurements and viewing data collection is enabled by the use of two digital devices, one installed by the broadcaster (Embedder) at station head end/transmission site(s) and the other device, the BAR-O-Meter is installed on each TV set in the panel household.

Watermark Embedder

Embedder equipment is placed at the Broadcaster's headend where signal transmission begins. It embeds a unique watermarked code in the audio component of the program content workflow. This code consists of the Channel ID & the time stamp. Each channel has its own unique code (or codes, in case the channel has taken a back-up). Once the unique watermark IDs are generated and assigned to each broadcast station cooperating with BARC India, the embedder is installed at the broadcaster's headend transmission site and a special station specific electronic card is inserted. The results in the embedder continuously placing a time stamped channel name and watermark ID in the station's content workflow. The watermark is an inaudible audio code made available to TV broadcasters that subscribe to and support the BARC India measurement of TV audiences. A master list of TV Station Watermarked IDs is stored on the BARC server and downloaded to BAR-O-Meters for the identification and measurement of TV Station viewing.

BAR-O-Meter

After receiving householder consent, the PMA recruiter connects the BAR-O-Meter to the TV set and establish a wireless network connection with the BARC server. The connection process automatically creates and assigns a unique HHID for that household. Once an ID is created for a HH, it is unique to that HH and is never re-used or assigned to another household.

The BAR-O-Meter consists of a main unit, a display unit and a probe that captures the audio output of the TV set. Each main unit is equipped with a microprocessor and modem and placed near the TV set being measured in the panel household. Each main unit has an audio probe attached to it that is either placed near the TV set or connected to the line or audio out of the TV. The probe captures the audio feed of each tuned TV signal and feeds this to the main unit where the watermarked station IDs placed in the audio by the TV station embedder are identified when selected, time stamped and stored for transmission as viewing events to the BARC central site server. The BAR-O-Meter has a handheld remote control unit with buttons made available for assignment to household members who are asked to press their button when viewing TV. Each panel household member aged 4 years and older is assigned a button on the remote control of the BAR-O-Meter. Separate buttons on the remote are reserved on the remote for guests to use, entering their gender and age bracket when viewing TV.

The BAR-O-Meter continuously and passively captures TV viewing events in real time, recording the time and duration of watermarked channel tuning events and capturing the viewership events of individual members that have pressed their viewer ID button to confirm their presence in the audience. The main unit stores the individual time stamped events for transmission to the BARC server. The captured raw data is then received by the BARC server where it is simultaneously backed up and made available for pre-processing software that cleans the raw event data, checking for errors and inconsistencies.

Processing, Audience Estimation and Reporting

The preprocessed data is then subjected to further processing with software that performs data editing, validation and weighting, a process that assigns a weight or factor to each household and each household member that reflects their proportionate representation of the universe. Sample weighting is a statistical process used to compensate for imbalances that may exist between the daily In-tab reporting sample of BARC panel households/individuals and the estimated universe of Indian TV households/individuals published by BARC. The twin data sources used by BARC in preparing Annual Universe Estimates are Census 2011 updated to reflect the current year's population and BARC's Broadcast India Establishment Survey that defines households with a TV set by state and TC together with their NCCS profile.

The final weighted and projected audience viewing output is encrypted and made available to BARC India subscriber through the BARC India Media Workstation (BMW) desktop software; a powerful reporting and analysis platform developed for BARC India to present India TV audience data in a form suitable for use by subscriber media companies, media agencies and advertisers.

On a daily basis, BARC India monitors the output of preprocessing, processing as measured by the daily In-tab for key sample strata. The In-tab is defined as the number of HHs and Individuals in the final output. Fluctuations in the In-tab level are typically the result of new HH recruitments, panel churn, weather and environmental events that impacts viewership, GSM network problems that affect data collection and changes in

household and household member viewing behavior. As previously mentioned, statistical weighting of the In-tab sample is a best practices method of compensating daily variations in the In-tab sample composition.

Program Schedules and Channel Line-ups

BARC India has contracted an independent company as its partner to collate the play-out data aired by cooperating BARC India broadcasters, ensuring correct integration of the broadcast data stream thrown out by the embedder at each TV Station and the watermarked time stamped BAR-O-Meter viewing events. Currently more than 400 channels are being monitored. The monitored content is downlinked and continuously monitored for each BARC India watermarked channel. Automatic content recognition software (“ACR”) technology also known as audio signature or audio fingerprinting technology is used to identify programs, promotions and ads.

Client Deliverables - BARC India Media Workstation (BMW)

BMW is BARC India’s licensed desktop software distributed to BARC India media, agency and advertiser stakeholders for their use in audience reporting, analyzing, targeting and planning. Each Thursday, on a regular weekly basis, BARC India issues daily reports of TV audience viewing using the BMW tool. The BMW software tool enables the end user client to access customized reports, graphical representation, individual analysis, audience movement and other features that make it easier for users to measure performance and establish trends. Some of the key features of BMW which are accessible to the client include:

- **AudView:** Analysing viewership based on time band based on the pre-identified target group
- **AdView:** Deeper advertising led analysis by identifying and scheduling ad-spots
- **PlanView:** Automated process of media planning (Ad budgets/reach/frequency/CPRs)
- **TeleView:** Multi-channel viewing pattern & rating analysis
- **Classic Grid analysis:** It relates both to time-bands and to programs, builds a grid of programs, filtered by time slots, with the daily audience values (audience variables) for each program.
- **Rating Curve:** BMW uses a more flexible module, which allows making multidimensional selections and displaying more than one audience variable at the same time.

Limitations and Permissible Use of BARC TV Audience Measurements

Separately BARC has published documents that describe in detail the statistical limitations of BARC TV Audience Measurements and policies regarding the permissible use and public disclosure of BARC data.