Hong Kong TV Content

Gold Standard

(Version 3.0)
(Latest Update in Nov 2017)

Prepared by: HKTAM Founding Subscribers Committee

Hong Kong TV Content
Gold Standard

Table of Content

1. Background

Since the Hong Kong Television Audience Measurement (HKTAM) service has opened up in 2001. Anyone can subscribe to the Respondent Level Data (RLD) (defined in Section 4.2) to develop their own applications software. This document "Hong Kong TV Content Gold Standard (HKTVCGS)" is designed to standardise all aspects relating to the HKTAM service, where data are sourced from the HKTAM service. The standard is intended for subscriber, applications software developer, the industry, HKTAM data users and the service provider (hereafter called users) to follow.

2. Objectives

The HKTVCGS is designed for the following objectives:
➢ To standardize all terminologies relating to the HKTAM service and its reports in whatever format, including all applications software or hardcopy;
➢ To standardize the calculation and algorithm of related terminologies listed in the HKTVCGS whenever included in any reports or applications software with HKTAM data;
➢ To standardize the interpretation of data or information generated from the HKTAM service.

3. Introduction

This document is designed and approved by the Founding Subscribers Committee (FSC) with support from the Hong Kong Television Industry Research Council (TVIRC) and the service provider.

In the HKTAM service, TV content refers to the linear TV content transmitted over the channels of licensed TV and OTT services which were agreed to be monitored amongst FSC and the service provider of HKTAM.

In order to ensure the quality and credibility of the HKTAM service, users shall conform to all specifications laid down in this document to produce their reports and to develop their applications software unless otherwise revised by FSC or its committee with endorsement from FSC.

For Users performing their own analyses using RLD, this document provides the approved method of calculation to which all such analyses should conform. By doing so, it will help to ensure that all users are working with the same 'currency' in the marketplace.

For users of the HKTAM service, including applications software developed or licensed by the service provider or applications software developers, this document may be helpful in interpreting the various analyses available and in particular for understanding the effect of selecting different base periods on audience estimates and ratings.

The measurement scope includes all viewing activities on TV set via Tuner, STB, Media/OTT Box, other peripherals and connected devices as well as mobile devices and computers via all kinds of connection methods. Any changes to the measurement scope will need to be reviewed and endorsed by FSC.

FSC welcomes all interested parties using the HKTVCGS.

The service provider of HKTAM will provide reasonable further guidance and assistance to all applications software vendors, regarding software specification and implementing these standards.

4. Definition of Terms

4.1 Gold Standard	This term is used both to denote the calculation procedures described in this Section and also the resulting estimates e.g. Gold Standard audience, Gold Standard rating.
4.2 Respondent Level Data	All calculations described in this section are at Respondent Level Data (RLD) – that is, viewing data at the person by channel by minute level or home by channel by minute level which are recorded by measuring equipment and generated after quality control system by service provider, where the editing rules of the quality control system were approved by FSC and adopted by users. Associated with the person or home are a variety of characteristics such as region, social class, age, household size etc., which may be used as descriptors or qualifiers for the analysis and are considered as a component of Respondent Level Data (RLD). Associated with the channel by minute is a programme or spot. These data are output by the quality control and processing systems of the service provider (Appendix 1). Since the elemental time period is the minute, a person is assigned as a viewer to a channel for an entire clock minute (or does not view for that minute) according to the rules stated in Section A1.5 of Appendix 1.
4.3 Types of Viewing	All viewing on TV set via Tuner, STB, Media/OTT Box, other peripherals and connected devices as well as mobile devices and computers via all kinds of connection methods will be reported by the following types: *(i) Live TV Viewing* This includes the real time viewing of transmissions broadcasting from TV stations whether directly from TV tuner or other connection methods. *(ii) Catchup Viewing* All delayed viewing of transmissions broadcasting from TV stations whether the transmissions are recorded by the viewers or other persons or provided by TV stations and viewed at some time in the future via any devices or connection methods. Types of viewing data and devices in particular to be included in HKTAM will be decided by FSC and HKTAM service provider.
4.4 Programme	Telecasts include programmes, commercials and promotions regardless of duration. In general, programme refers to telecast material produced or acquired by TV stations for linear channel broadcasting purposes according to the programme definition and requirements by the regulatory body of the HKSAR Government. For the specifications of programme and programme log, please refer to Appendix 5.

4.5 Minute / Quarter Hour / Hour	Minute is defined as the minute starting from the 00 second to the 59 second with totally 60 seconds. Quarter Hour is defined as every 15 minutes from the start of the research day. As the research day starts at 02:00:00 and ends at 25:59:59. The 1st quarter hour is 02:00:00-02:14:59, followed by 02:15:00-02:29:59, until the last quarter hour 25:45:00-25:59:59 of the research day. Hour is defined as every 60 minutes from the start of the research day. As the research day starts at 02:00:00 and ends at 25:59:59, the 1st hour is 02:00:00-02:59:59, followed by 03:00:00-03:59:59, until 25:00:00-25:59:59 as the last hour.
4.6 Category	Synonyms: Audience Category, Target Group, Target Audience. This is the population subgroup of an analysis e.g. Males aged 25-49.
4.7 Universe / TV Population	Synonyms: Universe Estimate, TV Population The overall HKTAM universe consists of all domestic households in the geographical coverage area that have one or more TV sets in working order, and all persons in such households. In Hong Kong, the viewing reported is defined as persons aged 4+ excluding foreign domestic helpers, drivers, gardeners etc. The term universe is also used to describe subgroups of these universes (demographic categories and/or geographic breakdowns). The Universes Estimate (or simply Universe) is the estimated number of people or homes in a category for the geographical region under analysis. It is usually expressed in thousands. Universe estimates are, wherever possible, based on an Establishment Survey or on official statistics. Universe estimates are calculated in one of the two ways: *(i)* *As a Hard Coded Potential (HCP)* Service provider supplies on request universe estimates for categories other than those used for daily weighting. Such HCP's are inputted into the applications software and all other applications software on a site-specific basis. Applications software may use the HCP as a category if it is set up. *(ii)* *As the Sum of Weights* In the case of a category which no HCP is provided, applications software sums the weights of each sample respondent in the category to provide a universe estimate for the category. Except for a special case, where the category is used for daily weighting, this type of universe estimate will vary with the different base periods. The sum of weights method is the current practice in the industry.
4.8 Audience Estimate	Synonyms: Audience This is the estimated number of viewers to a programme, time-period or advertising schedule, for a category, in 000's, among the TV population.

4.9 Average Audience	Synonyms: Audience For time-periods longer than a minute, audience estimates are first calculated at the minute-level, then averaged over the relevant total number of minutes. In these cases, the term Average Audience may also be used.
4.10 Programme Average Audience	Synonyms: Audience, Programme '000 The average audience for a programme is calculated from the first to the last minute, including any embedded commercial breaks. If a programme is recorded as being in two or more parts according to the rules in Appendix 5, then each part is treated as a separate programme for calculation purposes. This also applies to programmes across two research days.
4.11 Share	Synonyms: Channel share, Share of viewing, Audience share This is the percentage of the viewing audience accounted for by a particular channel at a specific point in time, i.e. of those people who are watching television, what proportion are viewing channel X. Shares are usually expressed as averages across the duration of programmes, dayparts, days or much longer periods. The base for calculating channel share can be restricted to those people who are watching one of the channels in a specific group, e.g. free-to-air channels only.
4.12 Rating	Synonyms: TVR (Television Rating), TARP (Target Audience Rating Point). This is the category audience expressed as a percentage of the category population. Individual rating normally lies in the range of 0-100%, except sum of home ratings across channels which theoretically may exceed 100%. For periods longer than a minute, the term Average Rating may also be used. The average viewing intensity of the category audience of the period or programme is a result of the average time spent of the category audience divided by the total duration of the period or programme. The [Average] Rating is calculated as: $$\frac{\displaystyle\sum_{k=1}^{n} \frac{\begin{array}{c}\text{Reach of the category audience}\\\text{of the specific period or}\\\text{programme on } k^{th} \text{ day}\end{array} \times \begin{array}{c}\text{Average Time Spent}\\\text{per viewer of the category}\\\text{audience on } k^{th} \text{ day}\end{array}}{\text{Category TV Universe on } k^{th} \text{ day}}}{\displaystyle\sum_{k=1}^{n} \begin{array}{c}\text{Duration of the specific}\\\text{period or programme}\\\text{on } k^{th} \text{ day}\end{array}} \times 100$$ n = number of the days for the specific period or programme

A simple example:

Assume a sample of 5 reporting respondents,
Over the time period 19:01-19:04, the viewing patterns of these 5 respondents are as follows:

Sample

Time	*S1*	*S2*	*S3*	*S4*	*S5*
19:01	*x*	*x*			
19:02	*x*				
19:03	*x*			*x*	
19:04	*x*				

Rating

During 19:01, rating sample = S1 + S2 $\qquad \dfrac{2 \times \frac{1}{5}}{1} \times 100 = 40$ TVRs

During 19:01-19:02, rating sample = S1 + S2 $\qquad \dfrac{2 \times \frac{3}{2}}{2} \times 100 = 30$ TVRs

During 19:01-19:03, rating sample = S1 + S2 + S3 $\qquad \dfrac{3 \times \frac{5}{3}}{3} \times 100 = 33$ TVRs

During 19:01-19:04, rating sample = S1 + S2 + S3 $\qquad \dfrac{3 \times \frac{6}{3}}{4} \times 100 = 30$ TVRs

a. Daypart Activities Rating
The Daypart Activities Rating is defined as the average percentage of viewers per minute within the reference universe on viewing day(s) that watched TV content via any devices or connection methods during specific time period.

The Daypart Rating is calculated as:

$$\frac{\displaystyle\sum_{k=1}^{n} \dfrac{\begin{array}{c}\text{Reach of the category audience} \\ \text{of the specific period} \\ \text{on } k^{th} \text{ viewing day}\end{array} \times \begin{array}{c}\text{Average Time Spent} \\ \text{per viewer of the category} \\ \text{audience on } k^{th} \text{ viewing day}\end{array}}{\text{Category TV Universe on } k^{th} \text{ day}}}{\displaystyle\sum_{k=1}^{n} \begin{array}{c}\text{Duration of the specific period} \\ \text{on } k^{th} \text{ viewing day}\end{array}} \times 100$$

n = number of the days for the specific period

b. Daypart Viewing Rating
The Daypart Viewing Rating is defined as the average percentage of viewers per minute within the reference universe on viewing day(s) that watched TV content via any devices or connection methods for specific telecast time within the Consolidation Window of Day 0 to Day 7 of the Research Days.

The Daypart Viewing Rating is calculated as:

$$\sum_{m=\text{Day }0}^{m=\text{Day}+7} \frac{\left(\dfrac{\text{Reach of the category audience on } m^{th} \text{ viewing day of the TV content - for specific telecast time on Day 0}}{\text{Category TV Universe on } m^{th} \text{ viewing day}}\right) \times \left(\text{Average Time Spent per viewer of the category audience on } m^{th} \text{ viewing day}\right)}{\text{Duration of the specific telecast time on Day 0}} \times 100$$

Day 0: TV telecast day of the specific telecast time
Day+1: 1 day after the TV telecast day of the specific telecast time
Day+2: 2 days after the TV telecast day of the specific telecast time
…
Day+7: 7 days after the TV telecast day of the specific telecast time

c. Programme Rating

The Programme Rating is defined as the average percentage of viewers per minute within the reference universe on viewing day(s) that watched TV programme via any devices or connection methods within the Consolidation Window of Day 0 to Day 7 of the Research Days.

The Programme Rating is calculated as:

$$\sum_{m=\text{Day }0}^{m=\text{Day}+7} \frac{\left(\dfrac{\text{Reach of the category audience on } m^{th} \text{ viewing day of the specific programme telecast on Day 0}}{\text{Category TV Universe on } m^{th} \text{ viewing day}}\right) \times \left(\text{Average Time Spent per viewer of the category audience on } m^{th} \text{ viewing day}\right)}{\text{Duration of the specific programme on Day 0}} \times 100$$

Day 0: TV telecast day of the specific programme
Day+1: 1 day after the TV telecast day of the specific programme
Day+2: 2 days after the TV telecast day of the specific programme
…
Day+7: 7 days after the TV telecast day of the specific programme

4.13 Home Rating	The Home Rating for a channel is the number of category homes (can be of different categories) consumed TV content of a channel expressed as a percentage of the category TV homes. (i) *Multi-TV set* If a multi-set home has one set tuned to Channel A and another to Channel B, it is counted in both the channels' Home ratings, but only once in the All Channels Home Rating. HUT is a synonym for the All Channels Home Rating. If a multi-set home has two sets both tuned to Channel A, then it is counted only once in the Channel A Home Rating and once in the All Channels Home Rating. (ii) *Multi-Screen* If a person watches TV content via any devices or connection methods at home, and watched TV content on a TV set at the same time, the viewing (can be the same channel or different channels ~~on~~ via TV set and any devices or connection methods) will be counted in both TV and Digital Rating. At Home level, it will be counted as two in the Rating level.
4.14 Programme TVR	This is the programme average audience (Section 4.9) expressed as a percentage of the category population.
4.15 Spot Audience, Spot Rating, Spot Reach	These are the Audience, Rating and Reach for a single commercial spot. *(i) Spot Audience and Spot Rating* If the duration of a commercial spot is less than or equal to 60 seconds, the audience and rating will be based on the minute in which the spot starts. If the duration of a commercial spot is more than 60 seconds, the Audience and Rating will be based on the average of the duration from the start minute and to the end minute of the commercial spot, same as that of a programme (defined in Section A5.7.2). *(ii) Spot Reach* The Reach will be based on the start minute of the commercial, regardless of the duration.
4.16 Gross Rating Point (GRP)	Synonyms: TARP (Target Audience Rating Point), Cumulative TVR GRP is the sum of the Spot Rating for an advertising schedule; it is the same as the Cumulative Audience expressed as a percentage of the category universe and may exceed 100%.
4.17 Index	Synonyms: Efficiency, Conversion Factor, Demo Index An index measures the efficiency of a particular programme or daypart in reaching a certain category audience. It can be calculated by $$\frac{\text{Category Rating}}{\text{Base Category Rating}} \times 100$$ where the base category is usually All Individuals 4+.

	A particular programme may have a low rating but a high index.

Example
A programme with All Individuals' rating of 2 and a children's rating of 3 gives a children's index of 150 and is therefore 50% more efficient at reaching children than All Individuals. |
| 4.18
CPRP | Synonyms: CPP

CPRP (Cost Per Rating Point) is the cost required to reach one percent of the category
$$= \frac{\text{Cost}}{\text{TVR}}$$ |
| 4.19
CPM | CPM (Cost Per Thousand) is the cost required to reach each thousand of the category
$$= \frac{\text{Cost}}{\text{Audience '000}}$$ |
| 4.20
CPRP Index | Synonyms: Cost Per Rating Point Index, CPP Index

The CPRP Index indicates the relative cost per rating point for a target audience against the cost per rating point of a base audience (e.g. all individuals aged 4+).

The Cost Per Rating Point Index is defined as follows:

$$\text{CPRP Index } = 100 \times \frac{\text{CPRP(target audience)}}{\text{CPRP (base audience)}}$$

e.g. if the TVR for the target audience is 10.0 and the TVR for the base audience is 6.0 and the cost for the spot is 100,000
$$\text{CPRP(target audience)} = \frac{100,000}{10.0} = 10,000$$
$$\text{CPRP(base audience)} = \frac{100,000}{6.0} = 16,666.67$$
$$\text{CPRP Index} = 100 \times \frac{10,000}{16,666.67} = 60$$

Alternatively, the CPRP Index can be expressed as:
$$100 \times \frac{\text{TVR (base audience)}}{\text{TVR(target audience)}}$$

Using the example above
$$\text{CPRP Index} = 100 \times \frac{6.0}{10.0} = 60$$ |
| 4.21
Frequency
Distribution | Frequency Distribution is usually used in an advertising schedule with N spots, it is the percentages of the category who have viewed 0, 1, 2...N spots respectively to form the frequency distribution. |

4.22 Cumulative Audience	This is defined as audience over a time-period or over a schedule of spots. For a time-period, it is the number of people in the category, in the population, who have viewed at least one minute in the period. For a schedule, it is the number of people in the category, in the population, who have viewed at least one spot.
4.23 Reach	Synonyms: 1+ reach, cover(age), 1+ cover(age), net reach For an advertising schedule, this is the percentage of the category that has viewed at least one spot. It is therefore the sum of the frequency distribution from 1 to N. The Reach will be based on the start minute of the commercial, regardless of the duration. For a time-period, the 'one-minute reach' is the category audience who have viewed (the programme, channel etc.) for at least one minute during the period, expressed as a percentage of the category population. The reach of a programme also includes embedded commercial breaks. *Example* *Assume a sample of 5 reporting respondents, over the time period 19:01-19:05, the viewing pattern of these 5 respondents is as follows* *Sample* | *Time*	*S1*	*S2*	*S3*	*S4*	*S5*
---	---	---	---	---	---
19:01	*x*	*x*			
19.02	*x*				
19:03	*x*		*x*		
19:04		*x*			
19:05					*x* | |	*Reach*
During 19:01, reached sample = S1 + S2	*40%*
During 19:01-19:02, reached sample = S1 + S2	*40%*
During 19:01-19:03, reached sample = S1 + S2 + S3	*60%*
During 19:01-19:04, reached sample = S1 + S2 + S3	*60%*
During 19:01-19:05, reached sample = S1 + S2 + S3 + S5	*80%* | For a programme, this is the percentage of the category who have viewed either: a) a minimum of x continuous or non-continuous minutes or b) a minimum of y % of the total programme duration
4.24 n+ Reach n+ Cover	For an advertising schedule, this is the percentage of the category viewing at least n of the N spots. It is calculated by summing the frequency distribution from n to N, e.g. 2+ reach = 2 to N; 3+ reach = 3 to N

4.25 Effective Reach	Effective Reach is defined as the percentage of the category viewing with a minimum exposure for a number of times (e.g. 3+, 4+) under a certain time period (e.g. 2 weeks, 4 weeks) to an advertising schedule, that are required to achieve its communication objective. This is usually pre-defined for every advertising schedule every time by considering different criteria.
4.26 Average Frequency	The average of the frequency distribution is usually calculated among the reached audience i.e. excluding the 0 (nil-viewing) group. It is therefore the average number of spots seen among those seeing at least one spot. It is equivalent to and may also be calculated as: $$\text{Average Frequency} = \frac{\text{GRPs}}{\text{Reach}}$$ *Example: if a schedule reaches 85% of the category and delivers 240 GRPs, then:* $$Average\ Frequency = \frac{240}{85} = 2.82\ spots\ seen\ per\ schedule\ viewer$$
4.27 Reporting Sample	Synonyms: In-tab sample HKTAM panel data is processed on a daily basis. Each day's reporting sample of homes and panel-members is composed of those whose responses have passed all the quality control thresholds. Each day's reporting sample may differ slightly from the previous day, due to: - new panel homes joining the panel - existing panel homes leaving the panel - existing panel homes being temporarily suspended for quality control reasons.
4.28 Middle Day Sample	Certain multi-day analyses require tracking the viewing behaviour of panelists across days. This requires a 'fixed' base sample to be defined, i.e. one day which is fixed throughout the analysis period. This sample may deliver audiences and rating which differ somewhat from the 'Gold Standard' rating, which for any day are based purely on that day's reporting sample. Various definitions may be adopted for the fixed sample e.g. panelists who report on every day of the analysis period, or panelists reporting on the first day of the analysis period. The convention is to use panelists reporting on the middle day of the analysis period: the 'Middle Day Sample'. If the analysis period contains an even number of days, rounding down will be applied e.g. the 'Middle Day' of a 22-day period is the 11th day. Middle Day must be based on actual programme / spots telecast period.

4.29 Average Viewing Hours per Viewer	This is the average time spent viewing a specified channel or programme within a specified time-period by those reached, i.e. viewing at least one minute.
4.30 Average Viewing Hours per Person	This is the average time spent viewing a specified channel or programme within a specified time-period by all members of the target audience/universe (including non-viewers). *Example* *For all days all times in the whole week of 0035:* *Channel selected = Channel A* *Total Viewers (4+) Reached = 6,020,000* *Population of the Viewers (4+) = 6,403,000* *Total Hours contributed by the viewers = 127,100,000 hours* *Average Viewing Hours Per Viewer* $= \dfrac{127,100,100}{6,020,000} = 21.1hrs$ *Average Viewing Hours Per Person* $= \dfrac{127,100,100}{6,403,000} = 19.9hrs$
4.31 Time Class / Time Zone	The time class / time zone classification usually follows those specified by TV stations in their rate card.
4.32 Station Migration	Synonyms: Station Switching, Channel Migration, Channel Switching It is a dynamic way to analyse the audience flow among channels during a specified time period at a fixed reporting interval (e.g. every 1 minute, or every 60 minutes). In every reported minute, how audience of a channel are originated from the previous minute and migrated to the next minute will be tracked. Different types of viewers can be classified and analysed: <u>New viewer</u> Those who have not watched any TV in the previous reporting minute. <u>Same viewer</u> Those who have watched the same channel in the previous reporting minute. <u>Migrated from other station</u> Those who have watched other channels in the previous reporting minute. Viewers can be further classified into different types based on the previous channels watched.
4.33 Duplicate Viewing	It is the tracking of the level of audience duplication among segments, where segment refers to a selection of channel & daypart. During a monitored time period, it is the measure of how many viewers who have viewed one segment and also viewed other segments (expressed in percentages).

4.34 TV Consumption	Overall performance of channel(s) during a specified daypart and/or for particular programme(s) which is measured against various indicators: - The percentage of people who have watched the channel (Reach, please refer to Section 4.22) - The average time spent (Average Viewing Hours Per Viewer, Average Viewing Hours Per Person, please refer to Sections 4.28 & 4.29) - Share of viewing (i.e. the percentage allocated to the channel out of the total minutes viewed)
4.35 TV Content	It refers to the linear TV content transmitted over the channels of licensed TV and OTT services which were agreed to be monitored amongst FSC and the service provider of HKTAM.
4.36 Viewing Day and Time	*Viewing Day* The day that the viewing behavior takes place. *Viewing Start Time* The time that the audience begins the viewing behavior, starting by the clock second. *Viewing End Time* The time that the audience finishes the viewing behavior, ending by the clock second.
4.37 Telecast Day and Time	*Telecast Day (Day 0)* The research day that the TV content is telecasted on linear TV. *Telecast Start Time* The time that the TV content is telecasted on linear TV, starting by the clock second. *Telecast End Time* The time that the TV content is finished on linear TV, ending by the clock second.
4.38 Live Viewing	It is defined as viewing of live telecast (Day 0) at the actual time of transmission, therefore it does not include any time-shift viewing.
4.39 As Live Viewing	It is defined as 'Viewing On the Same Day As Live (VOSDAL)'. It is also known as 'Catchup' viewing on the same day'. It covers Same Day As Live viewing of TV content that occurs within the same day (Day 0) of live telecast.

4.40 Consolidation Window	The Consolidation Window parameter defines the number of days for any catchup TV Viewing will be referenced against for allocation. For the HKTAM service, by "day" means a Research Day – the period of time reported by the HKTAM system on a daily basis (from 02:00:00 till 25:59:59). The Consolidation Window will be the 7 research days (a research day starts at 02:00:00 and ends at 25:59:59) after the live telecasts of TV content on linear TV (including 'Live' and 'Same Day As Live') for calculation of any catchup TV Viewing. Example: Consolidation data = Day 0* to Day 7 ** * Day 0 means Live and Same Day As Live on the Research Day ** Day 1 to 7 means 7 Research Days after Day 0
4.41 Buffering Time	Buffering time of 59 seconds to adjust TV Viewing to live TV viewing on TV set via connected devices.
4.42 Reporting Unit	The reporting unit is down to minute level.
4.43 Day	Day refers to a research day that starts at 02:00:00 and ends at 25:59:59, unless specified.

5. Reporting Standards

5.1
Minimum
Analysis
Sample

All applications software shall not run an analysis if the sample count for the category in the last day of the analysis period is less than 50.

All applications software shall issue a warning stating that the sample size is small if the sample count for the category in the last day of the analysis period is between 50 and 79.

These rules are intended to prevent unreliable estimates due to sampling error.

5.2
Rounding

Audience estimates are rounded and displayed to the nearest thousand.
Rating estimates are rounded and displayed to one decimal point.

5.3
Programme
Ranking

For programme ranking reporting standards, please refer to Appendix 7.5.

6. Single-Day Calculations

6.1
One-minute
Audience

A One-minute Audience estimate is calculated by summing the weights (the associated weighting contributions) of all viewers in the category, to that channel in that minute. The result is in 000's.

Example

If there are 12 viewers and their weights (in 000's) were: 15.9, 7.6, 43.9, 44.5, 61.8, 13.0, 39.6, 7.5, 64.2, 57.0, 14.3, 59.6, then the Audience is 428.9 (000).

6.2
One-minute
Rating

This is the One-minute Audience expressed as a percentage of the category universe.

Example

If the category universe for the example in Section 6.1 is 3,542 (000), then the Rating is:

$$\frac{428.9}{3542} = 12.1\%$$

6.3
Spot Rating

The Rating for a spot is the Rating for that channel for the minute in which the spot starts, regardless of the second on which it starts.

For Rating of long duration commercials such as *Advertising Magazine*, please refer to 4.14.

6.4
Average
Audience
within the day

The Average Audience for a time-period, programme or schedule falling within a single day is the average of the constituent One-minute Audience.

Example

If the minute audiences at 19:00, 19:01, 19:02 and 19:03 are 264, 268, 198 and 198 (000) then the Average Audience for 19:00-19:03 is
$$\frac{(264+268+198+198)}{4} = \frac{928}{4} = 232(000)$$

In practice, this is derived by adding the weights of all viewers in each of the minutes in turn, then dividing by the number of minutes (or spots).

6.5
Average
Rating within
the day

The Average Rating for a time-period, programme or schedule falling within a single day is calculated by expressing the Average Audience as a percentage of the category universe for that day.

| 6.6 | This is calculated as the percentage of the category seeing at least n of the N spots in |
| n+ Reach | an advertising schedule. Viewers are allocated to one (and only one) of the divisions from n to N depending on how many spots they have viewed. |

An audience estimate is calculated by summing the weights of all viewers in each division. The n+ reach is calculated by summing the audience estimates for all divisions from n to N and dividing the total by the universe of the category.

The 1+ reach is the case which includes all viewers, i.e. the sum of the audience estimates from 1 to N.

Example

An advertising schedule has 6 spots in one day and the calculation is for 3+ reach within a category that has a universe of 3,542 (000)

N = 6, n = 3

No. of spots:	*3*	*4*	*5*	*6*
Audience estimate:	*264*	*268*	*258*	*272*

$$3{+}reach = \frac{(264+268+258+272)}{3542} = 30.0\%$$

7. Multi-Day Calculations

7.1
Average Rating across days

Method 1:

The Average Rating across days is again an average over all constituent minute rating. It may alternatively be calculated by taking a duration-weighted average of the daily average rating.

Example

Day	Time-period	Duration	Average rating
Monday	*12:00-13:59*	*2h00m*	*14.3%*
Wednesday	*14:00-16:59*	*3h00m*	*21.6%*
Thursday	*06:00-08:29*	*2h30m*	*11.1%*
Friday	*17:00-20:59*	*4h00m*	*25.4%*

The Average Rating for all 11h30m is

$$\frac{(2 \times 14.3 + 3 \times 21.6 + 2.5 \times 11.1 + 4 \times 25.4)}{2 + 3 + 2.5 + 4} = 19.4\%$$

Method 2:

Average of all constituent minute <u>audience estimates</u> divided by the duration weighted average <u>universe</u>.

*** FSC recommended to standardize the calculation to method 1 and shall accept Method 1 from 1 Jan 2019.

7.2
Average Audience across days

The average audience across days is again an average over all constituent minute audience estimates.

7.3
Cumulative Audience

As noted in Section 4.21, Cumulative Audiences across days are based on the viewing of the *Middle Day Sample (refer to Section 4.27)* over the relevant period.

It is possible that some panelists may not report on all the other days, causing underestimation of the Cumulative Audience.

Reach and Frequency analysis for commercial spot in all applications software should employ a corrective algorithm that adjusts the Spot Rating upwards so that they sum to the Gold Standard GRPs (i.e. those based on the daily samples). The reach and frequency distribution are also adjusted in a consistent manner.

For further information on the corrective algorithm, please refer to Appendix 3 and 4.

7.4 n+ Reach	When the n+ Reach is calculated for a period of more than 1 day, the sample definition, demographics, weights and universe to be used are those for the middle day of the periods involved. Respondents that are not in the sample on the middle day are excluded from the analysis. Non-responses on other days are ignored - if middle day respondents do not report on another day, then they are assumed to be nil viewers on that other day. The convention for defining the 'Middle Day Sample' is recommended in Section 4.27. Once the 'Middle Day Sample' has been identified, the method described in Section 6.6 can be used to calculate the n+ Reach for an advertising campaign spread over a number of days.
	The corrective algorithm mentioned in Section 7.3 is also applicable in calculating the n+ Reach.
	For further information on the corrective algorithm, please refer to Appendix 3 and 4.
7.5 Programme Ranking Reports	In a multi-day analysis, ranking a set of programmes by their Audience Size sometimes produces a different order in comparison to ranking them by their ratings.
	It is recommended that programmes are ranked by Audience Size instead of Rating, on the basis that programmes may have identical Rating (to one decimal place) but with different audiences (in 000s).
	The ranking order shall be in the sequence of the following: ➢ By Average Audience Size; ➢ Then by Average Rating; ➢ Then by Average Audience Share.

8. Reporting and Calculation Rules for Daypart Activities Analysis

8.1
Reporting
Rules

The 'Daypart Activities' analysis is a 'viewer centric' measure. Both Live and catchup TV Viewing on a specific day should be taken into account.

Daypart Activities of monitored channels will be reported at channel level and grouped under Total TV. All other activities will be reported as unmatched viewing.

Within the 7-day Consolidation Window, the 'Daypart Activities' of one specific day is the total of:
   a) Live viewing on a specific day (Live)
   b) As Live viewing on the same day as the original telecast (Same Day As Live)
   c) Catchup viewing of TV content telecasted up to 7 days before that specific day of viewing (inclusive from Day -7 until Day -1).
   d) Usage or viewing via TV set that is unrelated to TV content telecasted on linear TV, or TV content viewed more than 7 days after the day of live telecast (Day 0).

8.2
Rating
Calculation

$$\text{Rating}_t = \frac{\sum_{r=1}^{R}(W_r P_{r,t,live} + W_r P_{r,t,tsv})}{\sum_{r=1}^{R} W_r} \times 100\%$$

Rating_t: Rating for time period t
R: number of respondents in the sample on viewing day
W_r: weight of the respondent r on viewing day
$P_{r,t,live}$: proportion of the time period t viewed live by respondent r where the proportion is equivalent to:

$$P_{r,t,live} = \frac{V_{r,t,live}}{\text{duration}_t}$$

$V_{r,t,live}$: live viewing duration of respondent r within a given time period t
duration_t: duration of the time period t
$P_{r,t,tsv}$: proportion of the time period t viewed As Live or catchup by respondent r where the proportion is equivalent to:

$$P_{r,t,tsv} = \sum_{Day-7}^{Day\ 0} \frac{V_{r,t,tsv}}{\text{duration}_t}$$

Day 0: As Live viewing on the viewing day
Day -1: Catchup viewing of content telecasted 1 day before the viewing day
Day -2: Catchup viewing of content telecasted 2 days before the viewing day
…
Day -7: Catchup viewing of content telecasted 7 days before the viewing day
$V_{r,t,tsv}$: As Live or catchup viewing duration of respondent r within a given time period t
duration_t: duration of the time period t

8.3
Reach
Calculation

$$\text{Reach}_E = \frac{\sum_{r=1}^{R} w_r d_{r,E}}{\sum_{r=1}^{R} w_r} \times 100\%$$

$$d_{r,E} = \begin{cases} 1 & j_{r,E} \geq J \\ 0 & j_{r,E} < J \end{cases}$$

E: the event (daypart or channel) selected for analysis

$d_{r,E}$: 'dummy' that indicates whether the respondent falls within the event Rating according to specific definition

J: criterion for the specific event Rating (i.e., 1 minute)

R: number of respondents in the sample on viewing day

W_r: weight of respondent r on viewing day

$j_{r,E}$: calculated according to the specific conditions, personal criterion of respondent for the event E

For Single Day Calculation:
Daypart Activities (e.g. Mar 1)
      a)   Sample Day = Mar 1
      b)   Period of Cumulative Reach: Mar 1

For Multiple Day Calculation:
Daypart Activities (e.g. Mar 1-5)
      a)   Sample Day (Middle Day) = Mar 3
      b)   Period of Cumulative Reach: Mar 1-5

Note of Middle Day: If the analysis period contains an even number of days, rounding down will be applied e.g. the 'Middle Day' of a 6-day period is the 3rd day.

9. Reporting and Calculation Rules for Daypart Viewing Analysis

9.1 Reporting Rules

The 'Daypart Viewing' analysis should only be reported for viewing from official sources.

The 'Daypart Viewing' of 1 specific daypart is the total of:

    a) Live viewing on the telecast day

    b) As Live viewing on the original telecast day, which is also called Same Day As Live

    c) Catchup viewing of TV content telecasted in the specific daypart until 7 days after the original telecast day (inclusive from Day +1 to Day +7).

The 'Daypart Viewing' analysis should only be reported if it is based on data including all live viewing, as live viewing and catchup viewing from Day 0 to Day +7.

9.2 Rating Calculation (based on Viewing Day)

$$\text{Rating}_i = \sum_{d=\text{Day } 0}^{d=\text{Day}+7} \frac{\sum_{r=1}^{R}(W_{r,d}P_{r,i,d})}{\sum_{r=1}^{R} W_{r,d}} \times 100\%$$

Rating_i: Rating for 'TV content telecasted in the specific daypart' i

R: number of respondents in the sample on viewing day

$W_{r,d}$: weight of the respondent r on viewing day d

$P_{r,i,d}$: proportion of the "TV content telecasted in the specific daypart" i viewed live, as Live or catchup by respondent r where the proportion is equivalent to:

$$P_{r,i,d} = \frac{V_{r,i,d}}{\text{duration}_i}$$

$V_{r,i,d}$: live, as live or catchup viewing duration of respondent r for 'TV content telecasted in the specific daypart' i on day d

duration_i: duration of 'TV content telecasted in the specific daypart' i

Day 0: 'Live' and 'Same Day As Live' viewing on the telecast day

Day +1: Catchup viewing 1 day after the telecast day

Day +2: Catchup 2 days after the telecast day

…

Day +7: Catchup viewing 7 days after the telecast day

9.3 Reach Calculation

$$\text{Reach}_i = \frac{\sum_{r=1}^{R} w_r d_{r,i}}{\sum_{r=1}^{R} w_r} \times 100\%$$

$$d_{r,i} = \begin{cases} 1 & j_{r,i} \geq J \\ 0 & j_{r,i} < J \end{cases}$$

i: the 'TV content telecasted in the specific daypart' i selected for analysis

$d_{r,i}$: 'dummy' that indicates whether the respondent falls within the specific Daypart Rating according to specific definition

J: criterion for the specific Daypart Rating (i.e., 1 minute)

R: number of respondents in the sample on telecast day

W_r: weight of respondent r on telecast day

$j_{r,i}$: the sum of live, as live and catchup viewing, calculated according to the specific conditions, personal criterion of respondent for the 'TV content telecasted in the specific daypart' i

For Single Day Calculation:

Daypart (e.g. 'TV content telecasted in the specific daypart' on Mar 1)

  a) Sample Day = Mar 1
  b) Period of Cumulative Reach:
     i.   Live: Mar 1
     ii. As live and Catchup: Mar 1 – 8 (Telecast Day + 7 days)

	Mar 1	Mar 2	Mar 3	Mar 4	Mar 5	Mar 6	Mar 7	Mar 8
Live	Y							
As Live and Catchup	Y	Y	Y	Y	Y	Y	Y	Y

For Multiple Day Calculation:

Daypart (e.g. 'TV content telecasted in the specific daypart' from Mar 1-5)

  a) Sample Day (Middle Day) = Mar 3
  b) Period of Cumulative Reach:
     i.   Live: Mar 1-5
     ii. As live and Catchup: Mar 1 – 12 (Last Telecast Day + 7 days)

	Mar 1	Mar 2	Mar 3	Mar 4	Mar 5	Mar 6	Mar 7	Mar 8	Mar 9	Mar 10	Mar 11	Mar 12
Live												
Dp 1	Y	Y	Y	Y	Y							
As live and Catchup												
Dp 1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note of Middle Day: If the analysis period contains an even number of days, rounding down is applied e.g. the 'Middle Day' of a 6-day period is the 3rd day.

10. Reporting and Calculation Rules for Programme Viewing Analysis

10.1 Reporting Rule	The 'Programme Viewing' analysis should only be reported for viewing from official sources and at programme level.

Within the 7-day Consolidation Window, the 'Programme Viewing' of 1 specific programme is the total of:

a) Live viewing on the telecast day
b) As Live viewing on the original telecast day, which is also called Same Day As Live
c) Catchup viewing of programme telecasted up to 7 days after the original telecast day (inclusive from Day +1 to Day +7).

The 'Programme Viewing' analysis should only be reported if it is based on data including all live viewing, as live viewing and catchup viewing from Day 0 to Day +7.

10.2 Rating Calculation (based on Viewing Day)

$$\text{Rating}_i = \sum_{d=\text{Day 0}}^{d=\text{Day}+7} \frac{\sum_{r=1}^{R}(W_{r,d}P_{r,i,d})}{\sum_{r=1}^{R} W_{r,d}} \times 100\%$$

Rating$_i$: Rating for programme i
R: number of respondents in the sample on viewing day
$W_{r,d}$: weight of the respondent r on viewing day d
$P_{r,i,d}$: proportion of the programme i viewed live, as live or catchup by respondent r where the proportion is equivalent to:

$$P_{r,i,d} = \frac{V_{r,i,d}}{\text{duration}_i}$$

$V_{r,i,d}$: live, as live or catchup viewing duration of respondent r for programme i on day d
duration$_i$: duration of programme i
Day 0: 'Live' and 'Same Day As Live' viewing on the telecast day
Day +1: Catchup viewing 1 day after the telecast day
Day +2: Catchup viewing 2 days after the telecast day
…
Day +7: Catchup viewing 7 days after the telecast day

10.3 Reach Calculation

$$\text{Reach}_i = \frac{\sum_{r=1}^{R} w_r d_{r,i}}{\sum_{r=1}^{R} w_r} \times 100\%$$

$$d_{r,i} = \begin{cases} 1 & j_{r,i} \geq J \\ 0 & j_{r,i} < J \end{cases}$$

i: the programme i selected for analysis
$d_{r,i}$: 'dummy' that indicates whether the respondent falls within the Programme Rating according to specific definition
J: criterion for the specific Programme Rating (i.e., 1 minute)
R: number of respondents in the sample on telecast day
W_r: weight of respondent r on telecast day
$j_{r,i}$: the sum of live, as live and catchup viewing, calculated according to the specific conditions, personal criterion of respondent for the programme i

For Single Day Calculation:

Programme (e.g. Prog A telecasted on TV on Mar 1)

    a) Sample Day = Mar 1

    b) Period of Cumulative Reach:

        i.   Live: Mar 1

        ii. As live and Catchup: Mar 1 – 8 (Telecast Day + 7 days)

	Mar 1	Mar 2	Mar 3	Mar 4	Mar 5	Mar 6	Mar 7	Mar 8
Live	Y							
As live and Catchup	Y	Y	Y	Y	Y	Y	Y	Y

For Multiple Day Calculation:

Programme (e.g. Prog A Epi 1-5 telecasted on TV on Mar 1-5)

    a) Sample Day (Middle Day) = Mar 3

    b) Period of Cumulative Reach:

        i.   Live: Mar 1-5

        ii. As live and Catchup: Mar 1 – 12 (Last Telecast Day + 7 days)

	Mar 1	Mar 2	Mar 3	Mar 4	Mar 5	Mar 6	Mar 7	Mar 8	Mar 9	Mar 10	Mar 11	Mar 12
Live												
Epi 1	Y											
Epi 2		Y										
Epi 3			Y									
Epi 4				Y								
Epi 5					Y							
As live and Catchup												
Epi 1	Y	Y	Y	Y	Y	Y	Y	Y				
Epi 2		Y	Y	Y	Y	Y	Y	Y	Y			
Epi 3			Y	Y	Y	Y	Y	Y	Y	Y		
Epi 4				Y	Y	Y	Y	Y	Y	Y	Y	
Epi 5					Y	Y	Y	Y	Y	Y	Y	Y

Note of Middle Day: If the analysis period contains an even number of days, rounding down will be applied e.g. the 'Middle Day' of a 6-day period is the 3rd day.

11. Sampling Error

11.1 Sampling Error

All Audience Estimates and Rating contain a degree of Sampling Error, arising from the fact that they are based on a sample of individuals drawn from the population, whose viewing will differ to some extent from that of the rest of the population.

The divergence between the Rating calculated from the sample and the true Rating in the population is never known (otherwise the error can be subtracted to produce an exact figure). However, statistical theory enables certain probability statements to be made about the error:

1. The Sampling Error can be positive (an over-estimate) or negative (an under-estimate), and these are equally likely.

2. The *likely* magnitude (though not the sign) of the Sampling Error may often be calculated, and this is referred to as the *Standard Error* of the estimate.

   Standard Error Formulae and its usage for TV Rating are provided in Appendix

3. Most Audience Estimates and Rating will be within plus or minus one Standard Error of the true figure. More exactly:

   Two-thirds of all Audience Estimates and Rating will be in error by at most one Standard Error.

   In addition :

   95% of all Audience Estimates and Rating will be in error by at most two Standard Errors.

   This is sometimes expressed as saying that plus or minus two Standard Errors around the Audience Estimates and Rating is a 95% confidence interval for the true figure.

11.2 Relative Error

The reliability of any estimate may be expressed by its Relative Error, defined as:

$$\frac{Standard\ Error\ Estimate}{Estimate} \times 100\%$$

Example: Audience Estimate 120 (000), with Standard Error 18 (000) gives Relative Error

$$= \frac{18}{120} \times 100\% = 15\%$$

An advantage of this measure is that both an Audience Estimate and the corresponding Rating have the same Relative Error.

The smaller the base sample for the category, the larger the Relative Error. By the same token, the smaller the Rating, the larger the Relative Error. In these circumstances, Sampling Error dominates other sources of error in the measurement system and can lead to unreliable estimates.

Appendix 1: Data Collection and Processing System

A1.1
Introduction

The HKTAM PeopleMeter data processing system comprises of three elements: data collection, audio matching (AMS) and production processing.

A1.2
Data
Collection

Each meter contains a GSM SIM card to enable connection to a 3G service. Each day, at 2.00 am the meters connect to a mobile network and deliver data to data collection servers in the service provider office. Should a meter transmission fail before completion, for whatever reason, the meter will make repeated transmission attempts. Data collection is normally completed before 4.00 am. Should a meter fail to transfer data by that time, the data of the meter will be transferred to a backup server for data delivery. This provides system resilience should the primary data collection servers fail.

During data transmission, the meters will synchronise clocks with the data collection server clocks. Time correction is only applied to the meter clocks; existing meter statements are transmitted without correction.

Data collection server clocks are synchronised with several NTP servers shortly before data collection starts. Should that fail for whatever reason, data collection will proceed as normal, but the meter clocks will not be synchronised.

In addition to transmitting data relating to channel and viewer registration, meters will transmit housekeeping data that are useful for QC and diagnostic services. If necessary, configuration data can be transmitted to meters from the data collection servers.

A1.3
Audio
Matching

The AMS system converts audio signatures retrieved from meters into viewing sessions.

For each audio channel to be measured, servers running bespoke software create "reference" signatures from a tuner set to the audio channel. This task is performed 24/7. To ensure system robustness, each audio channel shall be backed up by a second server and tuner, so that in the event of failure at the primary server, reference signatures are still available.

In a second process, servers running bespoke "matching" software retrieve reference signatures on an hourly basis. During data collection, these servers retrieve the meter statements and perform the matching to convert the signatures from each meter into viewing sessions.

The audio matching system operates 24/7 so that meter installation tests in panel homes can also include checks on channel identification.

| | A1.4 Production Processing | This system takes the output from audio matching and combines it with demographic data held in its databases, to produce output files for use by analysis systems. Output files are usually delivered after minute rounding. |

A1.4
Production
Processing

This system takes the output from audio matching and combines it with demographic data held in its databases, to produce output files for use by analysis systems. Output files are usually delivered after minute rounding.

Access to the system is restricted on a "need-to-know" basis, with password protection. Key personal information is encrypted for security purposes.

In addition to performing validation, weighting and file configuration, there is also a component that provides a user interface for panel management, coding and QC purposes. The interface is available to panel management and other appropriate staff.

Daily production runs are initiated after the audio matching processing has finished. In addition to the production of client files, other processes automatically identify homes where data may be incorrect and removes them from the reporting sample for that day.

A1.5
Persistence

The PeopleMeter and back office systems record second-by-second changes in:

a) Set status, i.e. on/off/channel switching

b) Person status, i.e. members or guest logging in or out

However, any change of state will not be included in recorded data unless it persists for a certain period of time which defined as follows:

a) 15 seconds for a change in set information

b) 30 seconds for member / guest login (a shorter interval less than 30 seconds may be applied as the minimum threshold subject to FSC's approval).

The time of the record is the true start second without delay. If a change does not persist sufficiently, the previous status is assumed to continue.

These persistence thresholds are applied due to limitations that prevent some activities from being identified when they persist for a very short duration and because fast activity changes do not represent normal viewing patterns. Investigations in different markets have repeatedly shown that the effect on rating is negligible.

Example
A viewer changed channels as follows:

	Channel	Time Range	Duration
a)	Channel A	19:38:20 – 19:39:14	55 seconds
b)	Channel B	19:39:15 – 19:39:22	8 seconds
c)	Channel C	19:39:23 – 19:39:42	20 seconds
d)	Channel D	19:39:43 – 19:39:59	17 seconds

Due to the application of persistence rules, the statements recorded in second-by-second data for the above activities are:

	Channel	Time Range	Duration
a)	Channel A	19:38:20 – 19:39:22	63 seconds
b)			
c)	Channel C	19:39:23 – 19:39:42	20 seconds
d)	Channel D	19:39:43 – 19:39:59	17 seconds

"b)" is left blank to indicate channel B viewing is not recorded as the viewing in this channel is less than 15 seconds.

A1.6
Attribution to the minute

After second-by-second credit results have been produced, the Production system processes the viewing statement with following rules.

a) If any status dominates the minute greater than 30 seconds, it will be counted in processing data.
b) If more than one channel is viewed in the same minute, the longest viewing time channel will be used for processing data. If viewing time is the same, the last one will be used.

Example
Use the viewing record from the example in A1.4 as follows:

	Channel	Time Range	Duration
a)	Channel A	19:38:20 – 19:39:22	63 seconds
b)			
c)	Channel C	19:39:23 – 19:39:42	20 seconds
d)	Channel D	19:39:43 – 19:39:59	17 seconds

Thus, the channels viewed in minute "19:39:00 – 19:39:59" are

	Channel	Time Range	Duration
a)	Channel A	19:39:00 – 19:39:22	23 seconds
b)			
c)	Channel C	19:39:23 – 19:39:42	20 seconds
d)	Channel D	19:39:43 – 19:39:59	17 seconds

The minute "19:39:00 – 19:39:59" viewing belongs to Channel A.

A1.7
Daily Sample Definition

A home is accepted as daily sample in processed data if it passed all of checking criteria. If a home is accepted, all of its members' viewing and tuning statement will be accepted.

A1.8	Projection weights are computed on a daily basis for each home, member and guest. These weights are calculated by weighting variables, such as sex, age, household size and area to reduce the effect of daily fluctuations in the composition of the sample. Rim weighting method is used for the calculation.
Weighting	

Weights are held in a weights file cross-referenced to the viewing file by panel number, and may also be appended to the viewing file.

Accumulation of the weights of the viewers:

  - to a specified channel
  - in a given minute
  - within a defined audience category

will give the category audience estimate (in 000's) to that minute of the prevailing telecast.

Appendix 2: Standard Error Formulae & Usage for TV Rating

The calculation of the standard error is determined by the effect of three aspects: the effect of the weighting process, the effect of the conglomerate and the effect of the grouping of minutes.

This is the main formula for the calculation of the standard error. It's composed by three parts:

$$Err_{abs}(\hat{r}) = F_c \times F_e \times \frac{S_{str}}{\sqrt{n}} : \text{Standard error (s.e)}$$

Notation:

F_c : Conglomeration Factor

F_e : Weighting Factor

$\dfrac{S_{str}}{\sqrt{n}}$: Variance Factor

Effect of the weighting process

According to the design of the audiometry panel, members balance out through the distribution of each weighting variable in the ambit they belong to; in other words, we have a stratified sample which, in addition, is not a proportional sample since the size of the sample of each stratum is not proportional to the members in each stratum. Consequently, there is a loss of sampling efficiency due to weighting process. This in turn means an increase in the standard error of the estimated value. In other words, we lose precision in estimates.

It is easy to think that loss in precision can be assessed by calculating the standard error of the estimated value in a simple random sample and then comparing it with that of a stratified random sample. The following are the steps to be followed:

Notation:

d: duration time (in min) of the time band under study.
t_i: viewing time of the i-th member (in min).
n: size of the sample being worked on.
w_i: weight of the i-th member.
p_i: proportion of minutes viewed by the i-th member.

$$p_i = \frac{t_i}{d}$$

Estimator's expression:

$$\hat{r} = \frac{\sum_{i=1}^{n} w_i \bullet p_i}{\sum_{i=1}^{n} w_i} = \frac{\sum_{i=1}^{n} w_i \bullet t_i}{d \bullet \sum_{i=1}^{n} w_i}$$

Its variance is equal to:

$$S_{str}^2 = \frac{\sum_{i=1}^{n} w_i \bullet (p_i - \hat{r})^2}{\sum_{i=1}^{n} w_i}$$

Its standard (absolute) error is equal to:

$$Err_{abs}(\hat{r}) = \sqrt{\frac{\sum_{i=1}^{n} w_i^2}{\left[\sum_{i=1}^{n} w_i\right]^2} * S_{str}^2}$$

Similarly, you can calculate the rating, the variance and the standard (absolute) error, always setting off from a simple random sample - not a stratified (non-proportional) one.

$$\hat{r}* = \frac{\sum_{i=1}^{n} p_i}{n}$$

$$S_{mas}^2 = \frac{\sum_{i=1}^{n} (p_i - \hat{r}*)^2}{n}$$

$$Err_{abs}(\hat{r}) = \sqrt{\frac{1}{n} * S_{mas}^2}$$

The two variances are assumed to be identical. We next calculate the ratio between the two standard (absolute) errors: this ratio will be the result of the effect of weighting process.

Consequently,

$$F_e = \sqrt{\frac{n \bullet \sum_{i=1}^{n} w_i^2}{\left[\sum_{i=1}^{n} w_i\right]^2}}$$

Effect of the conglomerate

In the audiometry panel, apart from a stratified sample, where each stratum is an ambit, it is necessary to work with conglomerate, whereby each conglomerate is a home. This reduces costs considerably, although it also implies a loss in sampling efficiency, ie, an increase in the standard error. It has to be taken into consideration that members in the same home are related to one another, and consequently there is no independence among members in the same conglomerate. This implies an increase in the standard error too. The effect of the conglomerate is calculated by comparing the standard error of the estimated average of number of minutes a member has been viewing, with the error made when estimating the average number of minutes a home has been viewing. Estimates relate to the average number of minutes. We are therefore working in the same dimension (ie, minutes). Estimators however are calculated over differing sample sizes, and they therefore can compare with one another directly. This forces us to work with variation coefficients or, in other words, the estimator's deviation divided by its arithmetic mean. The whole process can be expressed as follows:

Notation:

n: number of members in the sample.
m: number of homes in the sample.
t_i: time viewed by the i-th member (in minutes).
T_j: time viewed by the j-th home (in minutes).

Please note: stratification has not been taken into account for this calculation. We are therefore working with a simple random sample.

$$\bar{t} = \frac{\sum_{i=1}^{n} t_i}{n}$$

$$\bar{T} = \frac{\sum_{j=1}^{m} T_j}{m}$$

We calculate the standard relative errors of the two estimates, ie, the coefficient of variation, for members and homes.

$$Err(\bar{t}) = \frac{\sqrt{\frac{1}{n} \bullet \frac{\sum_{i=1}^{n}(t_i - \bar{t})^2}{n}}}{\bar{t}}$$

$$Err(\bar{T}) = \frac{\sqrt{\frac{1}{m} \bullet \frac{\sum_{j=1}^{m}(T_j - \bar{T})^2}{m}}}{\bar{T}}$$

From here it is already possible to calculate the conglomerate factor by dividing the relative error of the average minutes viewed at home level by the same value at member's level.

$$F_c = \frac{Err(\overline{T})}{Err(\bar{t})}$$

Effect of the addition of minutes

The system for the calculation of the effect of the addition of minutes is identical to that of the effect of the conglomerate: we calculate the ratio of the standard error we estimate as the average with regard to a proportion. In other words, let us imagine we have a time interval of a quarter of an hour. Let's calculate first the rating for those fifteen minutes and calculate besides two standard errors: one will consider the rating as a proportion and the other will consider it as a mean. It should be borne in mind that the rating is only a proportion when the estimate if for a minute, and ceases to be so when the time interval is higher.

$$Err(\hat{r})_{prop} = \sqrt{\frac{1-\hat{r}}{n \bullet \hat{r}}}$$

$$Err(\hat{r})_{prom} = \sqrt{\frac{1}{\hat{r}^2 \bullet n} \bullet \frac{\sum_{i=1}^{n}(p_i - \hat{r})^2}{n}}$$

The division of these two expressions gives the right effect to the addition of minutes, provided the rating's error has been calculated as a proportion.

Example of calculation

Weighting Factor

$$F_e = \sqrt{\frac{n \bullet \sum_{i=1}^{n} w_i^2}{\left[\sum_{i=1}^{n} w_i\right]^2}}$$

F_e=1.113644798

Conglomeration Factor

$$\bar{t} = \frac{\sum_{i=1}^{n} t_i}{n} = 5.80698152 \qquad Err(\bar{t}) = \frac{\sqrt{\frac{1}{n} \bullet \frac{\sum_{i=1}^{n}(t_i - \bar{t})^2}{n}}}{\bar{t}} = 0.079306859$$

$$\overline{T} = \frac{\sum\limits_{j=1}^{m} T_j}{m} = 20.41877256 \qquad Err(\overline{T}) = \frac{\sqrt{\dfrac{1}{m} \cdot \dfrac{\sum\limits_{j=1}^{m}(T_j - \overline{T})^2}{m}}}{\overline{T}} = 0.097024222$$

$$F_c = \frac{Err(\overline{T})}{Err(\bar{t})}$$

$F_c = 1.22340266$

Variance Factor

$$S_{str}^2 = \frac{\sum\limits_{i=1}^{n} w_i \bullet (p_i - \hat{r})^2}{\sum\limits_{i=1}^{n} w_i}, \text{ where } \qquad \hat{r} = \frac{\sum\limits_{i=1}^{n} w_i \bullet p_i}{\sum\limits_{i=1}^{n} w_i}$$

$$\hat{r} = \frac{\sum\limits_{i=1}^{n} w_i \bullet p_i}{\sum\limits_{i=1}^{n} w_i} = 0.097559 \qquad S_{str}^2 = \frac{\sum\limits_{i=1}^{n} w_i \bullet (p_i - \hat{r})^2}{\sum\limits_{i=1}^{n} w_i} = 0.057574594$$

$$\frac{S_{str}}{\sqrt{n}} = \frac{0.239947065}{\sqrt{974}} = 0.0076883998$$

Result

Standard error(s.e.): $Err_{abs}(\hat{r}) = F_c \times F_e \times \dfrac{S_{str}}{\sqrt{n}}$

= 1.22340266 * 1.113644798 * 0.0076883998

= 0.010474952176

s.e.(%)=1.05

Appendix 3: Reach and Frequency and the NBD Model

A3.1
Introduction

This note describes the use of the NBD (Negative Binomial Distribution) model. Reach & Frequency analysis for commercial spot shall be based on the model described in this section.

A3.2
Daily Samples and Middle Day Samples

R&F analyses are necessarily based on a sample of panel homes which is constant across the period of analysis. While a constant or 'fixed' sample can be defined in a number of ways, it is conventionally based on the 'middle day' sample i.e. those panelists who reported on the middle day of the analysis period e.g. day 10 out of 20, day 11 out of 21. Their viewing is analysed across all the days of the analysis period. This contrasts with, say, Quarter Hour Performance reports, where all viewing figures are based on the reporting sample for that specific day. The latter audiences and rating are termed the Gold Standard.

A3.3
Effect on Rating

The difference between the two sample bases gives rise to difference in audience and rating. The difference arises from three causes:

- the samples are different, except on the middle day itself

- their weights are different

- not all the day 11 sample will necessarily have reported on day 1 say; some may be new panelists subsequent to day 1, and some may have been temporarily suspended on day 1 for quality control reasons.

A3.4
Adjustment Procedure

Reach and Frequency analysis for commercial spot should employ a corrective algorithm which adjusts the spot rating so that they sum to the Gold Standard GRPs (i.e. those based on the daily samples).

Corrections of a consistent nature are also made to the reach and frequency.

As an example, suppose that the Gold Standard GRPs for a schedule of 50 spots is 180, over a 10 day period. The middle day is day 5 and this day's sample is used for R&F. The viewing of this sample is tracked over the 10 days and provides the following estimates:

GRPs	175
Reach	70%
Average Frequency	2.5

Note that 70 x 2.5 = 175.

The first stage of the correction is to multiply each spot rating by the factor 180/175 so that they now add to 180 rather than 175.

This will not make the individual spot rating identical to the Gold Standard rating though they will be closer.

It is also necessary to adjust either the reach or average frequency since their product is the GRPs. This could be done in a number of ways:

- Adjust reach by 180/175, giving 72%; so that 72 x 2.5 = 180, or

- Adjust avg. freq. by 180/175, giving 2.57[1]; so that 70 x 2.57 = 180, or

- Adjust both reach and avg. freq. by some smaller factors whose product is 180/175 e.g.

    70 x 1.01 = 70.7
    2.5 x 1.02 = 2.55
    so 70.7 x 2.55 = 180

The first method runs the risk that the adjusted reach could exceed 100%.

The last method has most intuitive appeal, since it is likely that the lower GRPs shown by the middle day sample is partly owing to some light schedule viewers being missed entirely (reduction in reach) and partly owing to some but not all spots being missed from heavier schedule viewers (reduction in average frequency).

The apparent difficulty is that there are an infinite number of possibilities of this last type. The role of the NBD model is to provide a systematic choice from these alternatives; it is also a choice with statistical merit.

| A3.5 The NBD Model | The NBD is a statistical distribution which has been found to fit closely to observed media-exposure distributions. This is because it is in fact the result of compounding two other distributions, which describes the two sources of variation in frequency: |

- Cross-sectional i.e. different likelihood of seeing a spot for different viewers

- Over time i.e. the uncertainty as to whether a given viewer will see any particular spot.

The cross-sectional variation is modelled by a Beta distribution, which describes the distribution in viewing probabilities over the range (0,1) across the population.

The over-time variation is modelled by the Poisson distribution, which is the standard distribution for predicting the number of events which occur in a time-period when their rate is constant but their actual timing is random. Here the events are viewing of each spot and the rate is the probability of viewing any one spot for a given viewer.

A3.6 Fitting the NBD

Like all statistical distributions, the NBD is in fact an infinitely large family of distributions which follow the same formula and hence basic shape, but with different means and variances. Each member of the NBD family is defined by choosing particular values for two parameters conventionally denoted (a, k).

The NBD then provides the complete frequency distribution of the schedule:

$$Proportion\ Viewing\ i\ Spots\ = \frac{\Gamma(k+i)}{\Gamma(k)\ \ \Gamma(i+1)}\left(\frac{1}{1+a}\right)^{k}\left(\frac{a}{1+a}\right)^{i}$$

where $\Gamma(x)$ is the [1]Gamma function

This can be expressed more simply for computational purposes:-

$$Proportion\ Viewing\ 0\ Spots\ = \left(\frac{1}{1+a}\right)^{k}$$

$$Prop.\ Viewing\ i\ Spots\ = \left(\frac{k+i-1}{i}\right)\times\left(\frac{a}{1+a}\right)\times Prop.\ Viewing\ i\text{-}1\ Spots$$

In its use in R&F, two members of the family are used.

The first is that which most closely fits the R&F curve tabulated for the Middle Day Sample. 'Most closely' means the member which has the same Reach and Average Frequency as the tabulated distribution. Knowing these enables the appropriate values of (a, k) to be calculated.

The second member used is the R&F curve which shares the same value of k but where a is adjusted by the factor:

Gold Standard GRPs / Middle Day Sample GRPs

In the earlier example in section 4, this factor was 180/175.

The new NBD curve resembles the first one but is 'tilted' slightly to give the required GRPs (180 here). Its formula also provides the new frequencies (and hence reach).

The NBD is efficiently and conveniently fitted by equating the actual and theoretical values of:

	Actual		Theoretical

$$\text{\textit{Proportion Viewing }} 0 \textit{ Spots} \quad P_0 \;=\; \left(\frac{1}{1+a}\right)^k$$

and

$$\text{\textit{Total Ratings for Schedule}} \quad T \;=\; 100.ak$$

Rearranging these two formulae, we can derive the following:-

$$a = -c.\ell n(1+a) \quad \textit{where} \quad c \;=\; \frac{T}{100 \times \ell n(P_0)}$$

and

$$k \;=\; \frac{T}{100 \times a}$$

Example

<u>*Frequency Distribution*</u>

Number of Spots Seen	Weighted % of Sample Base
0	27
1	21
2	16
3	13
4	6
5	5
6	12
Total Rating	244

Using the data above we have:

$$P_0 \;=\; 0.27 \qquad T = 244$$

Then

$$c = \frac{244}{100 \times \ell n(0.27)} = -1.864$$

And

$$a = 1.864 \times \ell n(1 + a) = 2.1222 \quad \text{after iteration}$$

$$k = \frac{244}{100 \times 2.1222} = 1.1498$$

Having calculated 'k' and 'a', the full modelled frequency distribution is calculated and compared with the actual 'raw' frequency distribution:-

Number of Spots Seen	'Raw' Actual Distribution %	Modelled NBD Distribution %	Difference % Points
0	27	27.0	0.0
1	21	21.1	-0.1
2	16	15.4	+0.6
3	13	11.0	+2.0
4	6	7.8	-1.8
5	5	5.4	-0.4
6+	12	12.3	-0.3
Total Rating	**244**	**244**	-

The model is seen to perform well. However, whilst almost certainly within sampling error, the deviations may demonstrate a weakness in the model or the ability of the scheduler to 'beat' the expected pattern. For whatever reason, it is considered sensible to retain these differences for final adjustment of the scaled-up frequency distribution.

A3.7
Retaining
Deviations

While the method as described so far achieves the primary aim of matching the Gold Standard GRPs, it suffers the drawback that the adjusted frequency distribution will always be 'smooth', since it is based on the NBD formula. By contrast, the observed distribution will generally display irregular deviations from the closest NBD. For example, there may be more viewers of exactly 2, 3, 6 and 7 spots, and fewer viewers of 1, 4, 5 and 8 or more spots than in the closest NBD. Since this is potentially useful information, it is desirable to retain it in the final distribution.

The full fitting process incorporating this refinement is therefore as follows:

● Fit the NBD to the tabulated middle day sample R&F, giving the values of the parameters (a, k).

● Compute and set aside the deviations of the tabulated distribution from this NBD

● Adjust the value of the parameter a as described.

- Compute the frequencies of the new NBD

- Add back the deviations to give the final curve

A3.8 Relationship to Print and Radio Models	The NBD may also be used to predict the R&F to other media such as print and radio. Its use in these applications is different in nature to TV. Exposure data for these media are not usually based on a continuous panel as for TV, but on recall (for print) or on short-term diaries (for radio). In neither case is it possible to observe the frequency distribution directly as can be done for TV schedules. The NBD (or some other statistical model) therefore provides a way of estimating the shape of distribution.
	The use of the NBD within TV R&F is much more limited, since the frequency distribution can be observed and directly tabulated. The only role for the NBD is to tilt this curve slightly to gain agreement with the Gold Standard GRPs.
A3.9 The NBD and BBD	As hinted above, the NBD is not the only possible distribution that might be used. A close relative, the BBD (Beta Binomial Distribution) is also suitable, as it is also for the larger task required for print and radio described above.
	The NBD and BBD each has their own advantages but these largely relate to computational convenience rather than intrinsic merit.

Appendix 4: Reach and Frequency Algorithm and Example

This algorithm covers the procedures for fitting a probability model to the weighted frequency distribution from the "raw" Reach and Frequency analysis of a schedule or defined segment of a schedule, and then scaling this up to "published" TVs.

Inputs

n	=	Number of spots in the schedule
fc(i)	=	Proportion of (weighted) individuals viewing i spots in the schedule (i=0,1,2,……n) as calculated in the "raw" reach and frequency analysis.
tc	=	Total TV s as calculated in the "raw" reach and frequency analysis.
tp	=	Total TVRs for schedule, calculated using the Gold Standard.

   Note: The input values fc and tc should be the internal calculated values i.e. not rounded or truncated.

Output

fp(i)	=	Proportion of individuals viewing i spots in the schedule (i=0,1,2,……n) but consistent with Gold Standard rating.

Other Notation

c	=	A constant used in the estimation of NBD parameters.
$ln(x)$	=	The natural logarithm of x
a, k	=	NBD parameters
abs(x)	=	The absolute value of x
ap	=	Scaled-up NBD parameter
pc(j)	=	NBD estimate of "raw" frequency distribution
pp(j)	=	NBD estimate of preliminary scaled-up frequency distribution
λ	=	Poisson parameter
Λ	=	Scaled-up Poisson parameter

Algorithm	**Comment**
$j = 0$	Single spot schedule.

$$\text{if } n = 1 \text{ then go to } 50$$

10	if fc (j) > 0 then go to 20	Check for initial zero frequencies

$$\begin{aligned}
&\text{fp}(j) = 0 \\
&j = j + 1 \\
&\text{tc} = \text{tc} - 100 \\
&\text{tp} = \text{tp} - 100 \\
&\text{go to } 10
\end{aligned}$$

(e.g. 1+reach = 100) and set up input data for model fitting to the remainder of the distribution if this happens.

20	if $\text{fc}(j) = 1$ then go to 70	Check for frequency = 100%

$$c = \text{tc} / \left(100 \times \ell\,\text{n}\big(\text{fc}(j)\big)\right)$$

Calculate 'c'.

$$\text{if } c \geq -1 \text{ then go to } 50$$

Check for Poisson condition.

$$a = -2 \times (1 + c)$$

30	$b = a$	Estimate NBD parameter 'a' iteratively.

$$a = c \times \left(a - (1+a) \times \ell n(1+a)\right) / (1 + a + c))$$
$$\text{if abs (b-a)} < 0.0001 \text{ then go to } 40$$
$$\text{go to } 30$$

40	$k = \text{tc} / (100 \times a)$	NBD parameter 'k'.

$$\begin{aligned}
&\text{ap} = a \times \text{tp} / \text{tc} \\
&\text{pc}(j) = \text{fc}(j) \\
&\text{pp}(j) = (1/(1 + \text{ap}))**k \\
&\text{fp}(j) = \text{pp}(j)
\end{aligned}$$

'ap' = scaled-up parameter 'a'. NBD estimates of first non-zero frequency for 'raw' and scaled-up distributions.

$$\begin{aligned}
&\text{sum} = \text{fp}(j) \\
&a = a / (1 + a) \\
&\text{ap} = \text{ap} / (1 + \text{ap})
\end{aligned}$$

Cumulative scaled-up frequency. Pre-calculation for following generation of all other frequencies.

$$\text{if } n = j + 1 \text{ then go to } 60$$

Check next frequency = last.

$$\begin{aligned}
&\text{for } i = j + 1 \text{ to } n - 1 \\
&\quad x = (k + i - j - 1)/(i - j) \\
&\quad \text{pc}(i) = x \times a \times \text{pc}(i - 1) \\
&\quad \text{pp}(i) = x \times \text{ap} \times \text{pp}(i - 1) \\
&\quad \text{fp}(i) = \text{pp}(i) + \text{fc}(i) - \text{pc}(i) \\
&\quad \text{sum} = \text{sum} + \text{fp}(i) \\
&\text{next } i
\end{aligned}$$

Sequential calculation of NBD estimates of 'raw', scaled-up and adjusted frequency distributions, and cumulative scaled-up and adjusted frequency.

$$\text{go to } 60$$

Go to last frequency calculation.

50	$\lambda = tc / 100$	Poisson parameter 'λ'.
	$\Lambda = tp / 100$	'Λ' = scaled-up parameter 'λ'.
	$pc(j) = \exp(-\lambda)$	Poisson estimates of first non-zero
	$pp(j) = \exp(-\Lambda)$	frequency for 'raw', scaled-up and adjusted
	$fp(j) = pp(j) + fc(j) - pc(j)$	distributions.
	$sum = fp(j)$	

$$\text{if } n = j + 1 \text{ then go to } 60$$

Check next frequency = last

$$\text{for } i = j + 1 \text{ to } n - 1$$
$$pc(i) = \lambda \times pc(i - 1) / (i - j)$$
$$pp(i) = \Lambda \times pp(i - 1) / (i - j)$$
$$fp(i) = pp(i) + fc(i) - pc(i)$$
$$sum = sum + fp(i)$$
$$\text{next } i$$

Sequential calculation of Poisson estimates of 'raw', scaled-up and adjusted frequency distributions, and cumulative scaled-up and adjusted frequency.

60   $fp(n) = 1 - sum$

Last frequency calculation.

end

70   if $j = n$ and $tp > 0$ then $tp = 0$
$fp(j) = 1 - abs(tp) / 100$
if $tp < 0$ then go to 80
if $j < n$ then $fp(j + 1) = tp / 100$
go to 90

Procedure when one of the 'raw' frequencies is 100%. The frequency in question is decreased and a value given to either the next frequency up or the net frequency down to generate the total 'published' TVRs. All other frequencies are set to zero.

80   $fp(j - 1) = -tp / 100$
if $j < n$ then $fp(j + 1) = 0$

90   for $i = j + 2$ to n
        $fp(i) = 0$
next i

end

Example

All Adults in TV households
51 channel X spots

Inputs

$tp = 280 =$ Total TVRs calculated using the Gold Standard tc
$= 244 =$ Total TVRs from reach and frequency analysis

$$fc(0) = 0.27$$
$$fc(1) = 0.21$$
$$fc(2) = 0.16$$
$$fc(3) = 0.13$$
$$fc(4) = 0.06$$
$$fc(5) = 0.05$$
$$fc(6+) = 0.12$$

$\}$ $fc(i) =$ Proportion viewing i spots, as calculated in the reach and frequency analysis.

$n = 51$

Algorithm

$$c = 244 /(100 \times \ell n(0.27)) = -1.864$$
$$a = -2 \times (1 - 1.864) = 1.728$$
$$b = 1.728$$
$$a = -1.864 \times (1.728 - 2.728 \times \ell n(2.728))/(2.728 - 1.864)$$
$$= 2.178$$
$$a = -1.864 \times (2.178 - 3.178 \times \ell n(3.178))/(3.178 - 1.864)$$
$$= 2.123$$
$$abs(b - a) = 0.055$$
$$b = 2.123$$

Continue Iterating

$$a = 2.1222$$
$$k = 244 /(100 \times 2.1222) = 1.1498$$
$$ap = 2.1222 \times 280 / 244 = 2.4353$$
$$pc(0) = 0.2700$$
$$pp(0) = (1/(1 + 2.4353))^{1.1498} = 0.2420$$
$$fp(0) = 0.2420$$
$$sum = 0.2420$$
$$a = 2.1222 /(1 + 2.1222) = 0.6797$$
$$ap = 2.4353 /(1 + 2.4353) = 0.7089$$

i = 1

$x = (1.1498 + 1 - 1)/1 = 1.1498$
$pc(1) = 1.1498 \times 0.6797 \times 0.2700 = 0.2110$
$pp(1) = 1.1498 \times 0.7089 \times 0.2420 = 0.1973$
$fp(1) = 0.1973 + 0.2100 - 0.2110 = 0.1963$
$sum = 0.2420 + 0.1963 = 0.4385$

i = 2
$x = (1.1498 + 2 - 1)/2 = 1.0749$
$pc(2) = 1.0749 \times 0.6797 \times 0.2110 = 0.1542$
$pp(2) = 1.0749 \times 0.7089 \times 0.1973 = 0.1496$
$fp(2) = 0.1496 + 0.1600 - 0.1542 = 0.1554$
$sum = 0.4383 + 0.1554 = 0.5937$

i = 3
$x = (1.1498 + 3 - 1)/3 = 1.0499$
$pc(3) = 1.0499 \times 0.6797 \times 0.1542 = 0.1100$
$pp(3) = 1.0499 \times 0.7089 \times 0.1496 = 0.1113$
$fp(3) = 0.1113 + 0.1300 - 0.1100 = 0.1313$
$sum = 0.5937 + 0.1313 = 0.7250$

i = 4
$x = (1.1498 + 4 - 1)/4 = 1.0375$
$pc(4) = 1.0375 \times 0.6797 \times 0.1100 = 0.0776$
$pp(4) = 1.0375 \times 0.7089 \times 0.1113 = 0.0819$
$fp(4) = 0.0819 + 0.0600 - 0.0776 = 0.0643$
$sum = 0.7250 + 0.0643 = 0.7893$

i = 5
$x = (1.1498 + 5 - 1)/5 = 1.0300$
$pc(5) = 1.0300 \times 0.6797 \times 0.0776 = 0.0543$
$pp(5) = 1.0300 \times 0.7089 \times 0.0819 = 0.0598$
$fp(5) = 0.0598 + 0.0500 - 0.0543 = 0.0555$
$sum = 0.7893 + 0.0555 = 0.8448$

etc.

<u>Output</u>

i Number of <u>Spot Viewed</u>	fc(i) Proportion Viewing <u>(Reach & Frequency)</u>	fp(i) Proportion Viewing (Consistent with Gold <u>Standard)</u>
0	0.270	0.242
1	0.210	0.196
2	0.160	0.155
3	0.130	0.131
4	0.060	0.064
5	0.050	0.056
6+	0.120	0.156
Total TVRs	244	280
1+ Reach	73.0%	75.8%
4+ Reach	23.0%	27.6%

Appendix 5: Programme & Programme Log

Programme refers to telecast material produced or acquired by TV stations for linear channel broadcasting purposes according to the programme definition and requirement of the regulatory body of the HKSAR Government.

A5.1   Time Synchronization

All TV monitoring system shall be synchronized with the clock of Hong Kong Observatory or worldwide established observatory to ensure accuracy.

A5.2   Programme Log Definition

As a general rule, programme log is a detailed record of all telecast information except TV commercials and API (Announcements in the Public Interest). All telecasts include TV programme, Programme Classification (e.g. PG, M) or multi-audio announcement, roller credits, theme song, programme preview, individual programme promo, station promo or cross channel promo shall be monitored. The classification of programme genre will be reviewed and endorsed by FSC.

Advertising Magazine and programmes which utilize commercial airtime such as *"TV Easy"* shall also be included in the programme log.

A5.3   Official Information in Programme Log

Currently, Programme Log of 9 domestic licensed free TV channels is provided by the official HKTAM service provider. However, the list of programme log monitored will be reviewed from time to time by FSC and service provider. To ensure consistency of TV programme and Commercial Break related analysis across all applications software, all applications software provider should follow the official information in such programme log. Official information includes:

a)   For Programme Segment
   - ➤ Date
   - ➤ Start Telecast Time (hh:mm:ss: 02:00:00-25:59:59)
   - ➤ End Telecast Time (hh:mm:ss: 02:00:00-25:59:59)
   - ➤ Channel
   - ➤ Name of Programme Segment
      - Full Programme Name Displayed in Chinese (for Chinese Channels)
      - Full Programme Name Displayed in English (for English Channels)

b)   For Programme / Station Promotion
   - ➤ Date
   - ➤ Start Telecast Time (hh:mm:ss: 02:00:00-25:59:59)
   - ➤ End Telecast Time (hh:mm:ss: 02:00:00-25:59:59)
   - ➤ Channel

A5.4   Programme Segment Start Time

The time when any information relating to a programme (includes Programme Classification or multi-audio announcement, Programme Title, Theme Song/Music, and Programme Shortcut Preview/Review) is shown. The Programme Start Time usually commences after Station ID, Station Announcement, Sponsor Billboard, Programme Announcement.

A5.5   Programme Segment End Time

➢ End time in showing Station ID with Copyright Label or Reverse multi-audio announcement (i.e. restoring original language from the preceding multi-audio broadcast)

➢ Usually shows after roller credit or programme preview, and before Station ID, Station Announcement, Programme Promo, Programme Announcement

➢ Takes the latest end time of roller credit, Programme preview before Station ID, station ID with Copyright Label, or Reverse multi-audio Announcement

➢ If no station ID with Copyright label displayed, it will take the exact end time of programme preview or start time of successive commercial/programme

➢ If programme preview showing AFTER the programme and BEFORE station ID with Copyright Label / Multi-audio Reversement, the end time = end time of station ID

➢ If programme preview showing AFTER the programme WITHOUT station ID with Copyright Label, the end time = end of preview

➢ If programme preview showing AFTER the station ID with Copyright Label, i.e. the programme preview is not part of the programme, the end time = end time of station ID

➢ If programme preview showing AFTER sponsor billboard / Commercial, the preview is not part of the programme

➢ If programme preview is for a different programme, it will not be treated as part of the programme

A5.6   Full Programme Name

The Chinese programme name/title of Chinese channels and English programme name/title of English channels that appears on screen at the beginning of a programme is used as the Full Programme Name.

The Chinese names of English channels report whatever available on the first screen. If there is no Chinese name displayed on the first screen, there will have no Chinese names for those programmes.

English names of the Chinese programmes will be based on the telecast schedule published in EPG or English names provided by broadcasters or alternative source.

The Full Programme Name shall include Programme Name, Sponsor Title and Umbrella Title.

A5.7   Calculating Programme Rating

A5.7.1 Handling of Mini-programmes

   a) Programme with duration[2] of less than 5 minutes are classified as mini-programme.

   b) The Full Programme Name Displayed in Chinese for Chinese channels and Full Programme Name Displayed in English for English channels are used to identify whether different programme segments belong to the same main programme.

   c) If a main programme A is interrupted by mini-programme, this mini-programme B will be ignored while calculating the average rating of main programme A. Thus, the average rating will base on the start / end time of main programme A. The rating of individual segments of programme A and rating for mini-programme B can be provided in all applications software, but they are not Gold Standard Rating.

   d) If a main programme A is interrupted by two or more consecutive mini-programmes, regardless of whether the total duration of the mini-programmes are less than or more than 5 minutes, those mini-programmes will be ignored while calculating the average rating of main programme A. Thus, the average rating will base on the start / end time of main programme A. The rating of individual segments of programme A and rating for mini-programmes can be provided in all applications software, but they are not Gold Standard Rating.

   e) If a main programme A is interrupted by programme B with duration of 5 minutes or more, then the two segments of programme A will be rated separately together with the ratings of programme B.

   f) These rules apply to main programmes only and mini-programmes with the same programme name will not be combined together.

---

[2]   Based on actual duration of the programme up to second level.

A5.7.2   Calculating Programme Rating down to Minute Level

Since rating is down to minute by minute level, when calculating programme rating, the start telecast time and end telecast time of a programme, which is down to second level, shall be rounded to the nearest minute.

a) Start Minute
   If the start second is between 00-29, the current minute will be counted as the Start Minute for the programme; otherwise the next minute will be used.
b) End Minute
   If the end second is between 00-29, the previous minute will be counted as the End Minute of the programme; otherwise the current minute will be used.

For Programme duration longer than 60 seconds,

Examples
Programme A   Actual Telecast Time: 19:00:32-19:04:22
              For rating calculation:
              Start minute: 19:01 (i.e. 19:01:00-19:01:59)
              End minute: 19:03 (i.e. 19:03:00-19:03:59)
              Ratings = Average of the minutes 19:01, 19:02 and 19:03

Under the above rules, in some cases such as if the Programme duration is less than or equal to 60 seconds, the End Minute is smaller than the Start Minute. As a result, the ACTUAL Start Minute will be used for calculation regardless the above Start / End minute rule.

For Programme duration less than or equal to 60 seconds

Examples
Programme B   Actual Telecast Time: 19:00:35-19:00:55
              For ratings calculation:
              Start minute: 19:01 (i.e. 19:01:00-19:01:59)
              End minute: 19:00 (i.e. 19:00:00-19:00:59)
              Ratings = Ratings of the minute 1900

Programme C   Actual Telecast Time: 19:00:02-19:00:25
              For ratings calculation:
              Start minute: 19:00 (i.e. 19:00:00-19:00:59)
              End minute: 18:59 (i.e. 18:59:00-18:59:59)
              Ratings = Ratings of the minute 1900

Programme D   Actual Telecast Time: 19:00:45-19:01:15
              For ratings calculation:
              Start minute: 19:01 (i.e. 19:01:00-19:01:59)
              End minute: 19:00 (i.e. 19:00:00-19:00:59)
              Ratings = Ratings of the minute 1900

A5.8   Calculating Commercial Break Ratings

A5.8.1   Defining Commercial Break

Commercial break shall include all telecasts except programme segments. In other words, a commercial break start time shall be the end time of the previous programme segment, while its end time is the start time of the next programme segment.

By following this definition, the following types shall be included in Commercial Break:

➢   Programme / Station Promotion
➢   Normal Spot
➢   Announcements in the Public Interest (API)
➢   Billboards / Sponsorship
➢   Greetings
➢   Time Check
➢   Station ID
➢   Programme Announcement
➢   Volume Down
➢   Index
➢   Weather Check

A5.8.2   Calculating Commercial Break Ratings down to Minute Level

Like programme ratings, the start telecast time and end telecast time of a commercial break, which is down to second level, shall be rounded to the nearest minute, for calculating of commercial break ratings.

In some cases when End Minute is smaller than Start Minute (after rounding), the Start Minute will be used for calculation.