



**Interactive Advertising Bureau Technology Laboratory
Mobile Marketing Association
Media Rating Council**

Mobile Application Advertising Measurement Guidelines

**Version 3.0
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Background

These guidelines have been developed through the joint efforts of the Interactive Advertising Bureau (IAB), Interactive Advertising Bureau Technology Laboratory (IAB Tech Lab), the Mobile Marketing Association (MMA) and the Media Rating Council (MRC). Version 1.0 was completed with guidance from members from all four organizations.

Modernizing Measurement Task Force

The IAB formed the MMTF (Modernizing Measurement Task Force) in 2015 to serve as an advisory body that is responsible for recommending prioritization and modernization of the MRC digital measurement guidelines. This group focuses on updating and maintaining guidelines that are led by the MRC with facilitation by the IAB Tech Lab and pertains to measurement guidelines that require third party and industry oversight such as this one.

All recommended updates will be presented to and reviewed by the MMTF as well as approved by the MRC in coordination with the MMA.

MMTF Participants

Ad-ID	FOX Networks Group	OwnerIQ
Adform	FOX News Channel	Pandora
AdGear Technologies, Inc.	FreeWheel	Parsec Media
ADLOOX	Genesis Media	PGA TOUR
Admiral Adblock Publisher Solutions	Google	Pinterest
Adsidious Media	Greentarget	Pixalate
ADVR	GroupM	Positive Mobile
Alliance for Audited Media (AAM)	Hanley Wood	PR Council
Annalect	Haymarket Media	PricewaterhouseCoopers
AppNexus	Hearst Magazines Digital Media	Publicis Media
Bank of America	Horizon Media	PubMatic
Bidtellect	Hotwire	Quantcast
BlogTalkRadio	Hulu	Reuters
BPA Worldwide	IAB Tech Lab	RhythmOne
Brightcove	IAB Canada	S4M
BrightRoll	Integral Ad Science	Snap, Inc.
Burson-Marsteller	IPONWEB Inc	StartApp
Burt	Jun Group	Tech Mpire
BuzzFeed	Leaf Group	TEGNA, Inc.
Cars.com	LifeScript	Teradata
CBS Interactive	Lithium Klout	Terra Networks USA
Celtra	Lonely Planet	The Daily News
Complex Media	Magna Global	The Weather Company
comScore	Management Science Associates	Throttle
Conversant Media	Mansueto Ventures	Time Inc.
Current	Markit Digital	Tremor Video
Demand Media	Mashable	TripAdvisor
Denstu Aegis	Mbooth	Txt Signal
deviantART	MBWW	Univision
Digital First Media	Media Rating Council	Unruly
Disney Interactive	Medialets	V12 Group
Dominion Digital Media	Mediavest Spark	Verve

DoubleVerify	Merkle	Viacom
Edmunds.com	Merriam-Webster / Britannica	ViralGains
Emogi	Moat	Visible Measures
Enthusiast Network	Mobile Marketing Association (MMA)	Washington Post Digital
Ernst & Young	Moxie	Weber Shandwick
ESPN.com	National Public Media	WebMD
Extreme Reach	Nativo	Webspectator
eyeReturn Marketing	NBCUniversal	White Ops
Eyeview	Nielsen	Woven Digital
Flashtalking	NPR	xAD
Fleishman Hillard	NYIAX, Inc.	Yieldmo
Flite	Ooyala	Zenith Media
Foursquare	OpenX	
Jumpstart Automotive Media	Opera	

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Scope and Applicability

These guidelines are intended to cover the measurement and disclosures related to dynamic, in-application advertisements that appear on mobile devices. These guidelines are not intended at this time to cover the following: hard-coded advertising, or sponsorships or advertising in a non-mobile environment (the nature of the environment generally can be determined based on the operating system used to access the advertisement). Mobile devices refer to a handset, tablet, or other communication device (running a mobile operating system) used to access the Internet wirelessly, usually through a mobile carrier or Wi-Fi network. Traditional PCs and laptops are not considered mobile devices for the purposes of these guidelines nor are hybrid devices running desktop operating systems.

For purposes of this document, mobile In-Application (In-App) refers to content and ads within the native User Interface of an application and not content within either a mobile browser or an embedded browser within an application environment (an instance that is embedded within a native application; typically, this occurs when a user clicks on a URL in a mobile application and the application executes the embedded browser). Mobile web (outside the scope of this document) refers to website content and ads within it, displayed within a mobile web browser or displayed by an embedded browser within an application environment (excluding interstitials).

This document is principally applicable to organizations involved in the mobile industry that develop mobile applications that facilitate advertising delivery to consumers. Additionally, the measurement-related practices can be applied to third-party measurement organizations in the mobile industry. This guideline is intended as a guide to accepted practices, as developed by the IAB, IAB Tech Lab, MMA and MRC. In addition, mobile application advertising planners and buyers can use this document to assist in determining the quality of ad measurements and the completeness of disclosures.

1.0 Measurement Definitions

Ad Impression: A measurement of responses from an ad delivery system to an ad request from the user's device, which is filtered for invalid traffic and is recorded at a point as late as possible in the process of delivery of the creative material to the user's device. The ad must be loaded and at minimum begin to render in order to count it as a valid ad impression. Measurement of begin to render should include logical components necessary to display the ad, but does not necessarily include logical elements that are not essential (such as other tracking elements).

In the context of the guidance above, “loaded” means the logical creative file has been transmitted and received at the client-side (user device) and “render” refers to the process of painting the creative file or adding it to any portion of the Document Object Model.

Application Ad Network: Ad networks that combines applications from many developers to allow an ad buyer to reach a wider audience across multiple applications.

Application Programming Interface (API): A set of routines, protocols and tools for building software applications. An API defines functionalities that are independent of their respective implementations, which allows definitions and implementations to vary without compromising the interface.

Client User: A mobile device that interacts with an application, essentially executing or otherwise

reviewing the application. The number of Users (people) or the demographic characteristics of the Users interacting with the application through the Client User is not necessarily known.

Deferred Ad Impressions: Ad Impressions that occur and are counted while a User (person) executes the application off-line. These Ad Impressions are then reported when the Client User reconnects on-line and the data for the off-line Ad Impressions are collected.

Dynamic In-Application Ads: Ads that can be dynamically changed; allowing the functionality of providing different ads across application Sessions to the same or different Users.

Event Based Ads: Ads that are generated as a result of an event in the application, typically triggered by a User's interaction with the application through the Client User.

Frequency Capping: A practice that limits the number of times an advertising message (ad impression) can be billed to buyers within a campaign and/or over a specified period of time. Frequency capping may also refer to limits placed on the number of times that an ad is to be delivered to a particular user over a period of time.

Hard Coded In-Application Ads: These ads appear within the application environment but cannot be changed from Session to Session or User to User. Essentially they are "hard coded" into the application itself; these ads are not within the scope of this present set of guidelines.

Pre-fetch / Pre-render: Pre-fetch refers to a request for and caching of Internet content by an application that occurs prior to, but in anticipation of, the request for the content by a user. Pre-rendering is a similar, but more aggressive technique, where actual page elements and even complete pages may be loaded in a browser prior to a user navigating to a page. Such requests (Pre-fetch and Pre-render) are generally made for the purpose of speeding content access (due to the in advance caching process) if and when the content is actually requested by the user.

As discussed throughout this document, a valid impression count must happen after the initiation of retrieval of underlying page content and only when ad content has been loaded and at minimum begins to render. As such, Pre-fetch and Pre-render requests do not qualify for measurement as a valid impression unless ad content has been loaded and at minimum begins to render in response to a request by a user.

Session: A single application-use event that spans an unspecified period of time of constant or ongoing application activity by a User through the Client User. Sessions are terminated by User actions indicating the closing of the application, or by inactivity levels that meet or exceed defined thresholds. Sessions are generally applicable to the calculation of reach metrics. See the IAB Audience Reach Measurement Guidelines for further guidance on Sessions.

Software Development Kit (SDK) Based Measurement: A separate sub-application within the application environment which is directed at performance of certain common functions such as measurement or counting of advertising activity and/or the delivery or storage of advertising content. These SDK Based functions can be developed by a third party to the application developer and fit into the application, thereby allowing a common measurement SDK to be used across applications.

Tracked Ads: The number of ads where measurement was initiated. These ads (referred to herein as Tracked Ads; alternate labeling may apply) must adhere to the requirements detailed in this document (including client-initiated counting and cache controls) except that they can be counted when a vendor's measurement assets have fully downloaded and initiated, but prior to ad content loading and rendering, this metric should not be labeled as an Ad Impression.

User, Unique User: A person using an application and exposed to advertising messages, as determined through registration, User self-identification or some form of heuristic. A Unique User is an unduplicated person using an application and exposed to advertising messages during a reporting period. For the requirements for reporting a Unique User metric, refer to IAB's Audience Reach Measurement Guidelines, available at www.iab.com.

2.0 Application Coverage and Basis for Projection

Applications can have varying coverage across the User population because of popularity, distribution methods, hardware and operating system compatibility limits or other factors. Therefore, it is important that sellers and buyers of application-based advertising understand and consider the coverage of the application itself. This is particularly important if any form of sampling is used in the measurement of application Ad Impressions or other measured metrics. Limitations in coverage should be considered in decisions about projectability of sampled Ad Impression results originating in applications.

These guidelines require disclosure (and, if projection is being considered, quantification) of application coverage to users of advertising measurements. The following coverage areas should be described (and/or quantified), and therefore considered in the use of advertising measurements.

Disclosures should be made at the lowest level of granularity of category applicable below:

2.1 Mobile Users

The use of mobile applications is generally limited to the population of mobile-capable people within a certain geographic area, e.g., country.

2.2 Platform Compatibility (e.g., Telephone, Tablets or Other Devices)

The use of a mobile application is restricted to certain device-types within the mobile segment, as well as to certain Operating Systems within the platform(s).

2.3 Downloaded Applications (Versioning, Where Applicable)

The use of a mobile application is restricted to only those situations where the User has downloaded the application to the Client User or can otherwise access application functions. If advertising delivery, functionality or measurement methodology has been changed between versions of an application in a manner that has significantly changed the user experience with the application (and the context in which ads within the application appear), this should be specified and quantified.

2.4 Opened, Initialized Applications (Duplication Considered)

The use of a mobile application is restricted to only those situations where the downloaded application has been opened and initialized after downloading. If more than one of the same applications has been downloaded, opened and initialized by a User, and the newer application download does not replace the existing application, then duplication should be considered in the reporting of Users or in Frequency Capping situations whenever possible. In general, de-duplication functions should be applied over the reporting timeframe – for example, for a weekly report, users that open and initialize more than one of the same applications on the same device should be de-duplicated within that week.

2.5 Applications In-Use (Duplication Considered)

The use of a mobile application is restricted to only those situations where the opened

application is in-use (either on or off-line) in a Session and advertising is taking place. Similar to 3.4 above, duplication should be considered. Users of the mobile application should be de-duplicated over the reporting timeframe for this metric; for example, for a weekly report, users that are using the same application concurrently on the same device should be de-duplicated. Significant volumes/situations of duplicated use should be investigated by the application provider/seller since this can sometimes be indicative of a processing error in initialization or usage counting functions.

3.0 Mobile Application Ad Measurement Guidelines

The following presents the guidance for Impression counting resulting from the deliberations of participants from IAB, IAB Tech Lab, MMA and MRC. This guidance is applicable to in-application measurement functions, regardless of whether they are inserted through an SDK or they are native to the application itself.

3.1 Impression Tracking – Technical Details

A measurement of an advertising occurrence, contained within real-time or stored and transmitted application use activity records, Client-initiated, recorded at a point as late as possible in the process of delivery of the creative material to the user's device when the ad was loaded and at minimum begins to render on the device (see note on Tracked Ads below), sourced from a fully downloaded, opened, initialized application in an application Session with a Client User. The advertising occurrences must meet or exceed the minimum requirements summarized below and be filtered for invalid traffic.

In the context of the guidance above, “loaded” means the logical creative file has been transmitted and received at the client-side (user device) and “render” refers to the process of painting the creative file or adding it to any portion of the Document Object Model.

Note: There will necessarily be some slight differences among measurers in the precise moment when rendering is measured as a qualification for ad impressions. The requirements above mean that the ad content must have been loaded at the client-side and at minimum begin to render into the user interface or application such that it can be at least partially visible (also referred to as ad injection or execution). Measurement of begin to render should include logical components necessary to display the ad, but does not necessarily include logical elements that are not essential (such as other tracking elements). It does not require any portion of the ad to be visible or displayed on screen. While technical limitations may preclude requiring measurement only after an ad has fully rendered, vendors not measuring fully rendered impressions are encouraged to periodically study and monitor differences between render initialization and completion.

This guideline requires measurement to be based on client-initiated application activity, sourced from application use activity records containing advertising occurrences; the extent to which any such activity has been ascribed or inferred should be disclosed, and impressions based on inferred activity should be segregated for reporting purposes. Server-initiated application activity (also known as count on decision or count on insertion) is not considered an acceptable basis for counting under these guidelines, consistent with other measurement guidelines issued by IAB, IAB Tech Lab, MMA, and MRC. However, pass-through methods of signaling interactions detected on the client side from server infrastructure are acceptable.

Please refer to Appendix A of IAB’s Desktop Display Impression Measurement Guidelines for

diagrams of examples of valid implementations of Client-initiated counting approaches. Please note that effective as of March 2016, only those examples where counting follows ad content delivery are acceptable client-initiated measurement approaches for mobile application ad impression measurement. Implementations in which counting precedes ad content delivery are no longer acceptable for mobile application ad impression measurement.

The original intent was to set impression requirements closest to actual opportunity to see by the user (see specifics below). However, since the original publication of these guidelines, the emergence of the viewable impression (as defined in the MRC Viewable Impression Measurement and MRC Mobile Viewable Impression Measurement Guidelines) as a separate metric has satisfied this intent. Ad impression measurement remains relevant at minimum as an input into viewability metrics (such as in the Measured Rate denominator) as well as a mechanism to quantify activity measured by organizations that might not be part of the advertising chain (such as non-ad-serving third-party measurement vendors).

A measurement vendor may elect to measure and report the number of ads where measurement was initiated. These ads (referred to herein as Tracked Ads; alternate labeling may apply) must adhere to the requirements above (including client-initiated counting and cache controls) except that they can be counted when a vendor's measurement assets have fully downloaded and initiated, but prior to ad content loading and rendering. This metric should not be labeled as an Ad Impression without qualification, but will assist both buyers and sellers in addressing rendering issues (by providing a means to ascertain ads that do not render) and support the transparency needed by organizations that track ads whether they render or not such as organizations that might not be part of the advertising chain (e.g., non-ad-serving third-party measurement vendors). Such measurement and reporting is allowable under these guidelines with proper disclosure and reporting in conjunction with qualified Ad Impressions.

To foster consistency in measurement and among all the parties in the transaction stream (and similar to guidance in the IAB Click Measurement Guidelines), the development of periodic and detailed reporting using a unique identifier, a unique numeric or alphanumeric string associated with the transaction, is encouraged (although not required at this time). This unique identifier is intended to assist in investigation or auditing, and is not necessarily intended for use beyond these internal purposes. A unique identifier should be considered when measuring and reporting Tracked Ads alongside Ad Impressions as well as other metrics outside this scope of this document (such as Ad Requests and Viewable Impressions) in order to foster a one-to-one relationship between these metrics.

Physical attributes of the advertisement and the placement of the advertisement within the application should be disclosed by campaign or placement type; this disclosure can be made as part of initiating the campaign with the advertising agency or buyer. Additionally, any variable attributes such as ad size of the advertising during the application Session should be described. Event Based Ads should be described in terms of attributes and trigger criteria.

The application measurement organization should have sufficient controls to determine that:

- The application was downloaded, opened and initialized as designed on that Client User prior to the measured Session.
- The application itself (or measurement assets within it) was functioning as intended during the session by examining data received for completeness or signs of corruption. Sessions and Ad Impression metrics associated with "faulted" conditions (situations of functionality issues with the application, errors or non-working conditions) should be tracked and segregated from fully functioning Sessions and Ad

Impression metrics.

Changes in page orientation during application use can be tracked as a native or SDK function, however, this does not alter the parameters for counting an impression or other ad metrics, except to the extent it may change the size of the ad.

Instances where users are encountering application loading screens are generally not counted as application activity, nor is the loading duration considered in-app duration. In certain instances these loading screens can contain advertising messages. In general these impressions or any other measured activity associated with loading screens (e.g., duration, mouse activity, etc.) should be segregated for reporting purposes where known from actual application use and advertising consumed during the application's user experience.

Application transaction records, which contain evidence of advertising, can be derived and transmitted to the application measurement organization: (1) on a real-time basis during application execution, (2) in batched groups that are transmitted periodically (in whole or in part) during an on-line application Session or, (3) first stored during off-line application use and later transmitted during a subsequent on-line Session (not necessarily associated with the same application) of the applicable Client-User.

In situations where the connection speed of the client-user can impact counting effectiveness or the counted activity itself, the application developer or SDK developer, if applicable, should make reasonable efforts to ensure counting is accurate. Editing and error handling rules should be developed to detect, segregate and report counting situations with suspect accuracy related to connection speed where known either directly within the application or by examining data received for completeness or signs of corruption. To consider an Ad Impression valid, the time at which the ad was rendered must be included within the reporting period and must be prior to billing for that period based on the pre-determined billing cycle. Thereafter, this activity may be reported on a segregated basis.

3.1.1 Sessions

While "Sessions" as a measure is in a different category than ad impressions, it is nevertheless relevant to in-application ad impression measurement in that certain edits often are used for in-application impression counting purposes that are based on sessions. Sessions is also a necessary component of Reach calculations. Therefore, consideration of what constitutes an application session is appropriate here.

An application Session is measured from the start of the application to the end-time of use of the application, as long as the application does not encounter inactivity of a pre-defined duration. Inactivity rules may be based on application idle, which is generally defined by the application developer based on time since last interaction and can result in an application running in the background or being inactive. Device idle or power state should also be considered for inactivity rules and may be user configurable.

These inactivity rules may vary based on the type of application involved. For instance, some applications are designed for long periods of inactivity (such as long-form video, or scoreboards, to name two examples), in which case a longer inactivity threshold may be more appropriate than in another situation where longer periods of inactivity are not normally to be expected. Or, as another example, while an application that is not in focus on the screen would usually be considered inactive (if out of focus for the pre-defined inactivity duration), in certain limited cases, such as

with applications that contain audio ads, the inactivity rules may allow for the application session to be considered as still active. In all cases, inactivity rules applied must be fully documented and disclosed.

The mobile environment may allow for differing options for determining user activity than are available in traditional online environments, and these should be leveraged in making inactivity determinations. For instance, screen dims and darks, or screen touches, can be used in helping to make inactivity determinations.

See the *IAB Audience Reach Measurement Guidelines* for further guidance on Sessions.

Reporting of Ad Impressions should mirror the requirements as specified in the ad insertion order, and should be agreed-upon upfront. For example, if an ad is purchased across an Application Ad Network as specified in the insertion order, the resulting Ad Impressions should be reported as delivered across that network; if the ad is purchased in only a single application, the resulting impressions should be only from the applicable application. Third party measurers may rely on buyer/seller users to provide these parameters.

3.2 Rich Media

See the IAB's Desktop Display Impression Measurement Guidelines for guidance on the measurement of Rich Media impressions, which should be consistently applied for measurement in mobile web environments.

With certain technologies, such as Ajax for mobile and similar executions, changes to page content and the serving of advertisements are not always clearly linked. Therefore, other methods are needed to trigger the counting of ad impressions. As the use of such technologies in mobile implementations becomes more prevalent, additional specific guidance for its measurement may be required. Until then, the user activity requirements associated with Ajax for mobile or similar executions in these definitions should be patterned after the IAB's Rich Internet Application Guidelines. For further information on user activity requirements in Ajax applications, see Section 2 of the IAB's Rich Internet Application Guidelines.

3.3 Video

Application ads can be served in a video format. For these instances, the requirements associated with a conventional application Ad Impression are applicable as described above. Additionally, similar to the requirements in conventional Internet Video Ad Guidelines, video advertising should be counted using a client-initiated technique only when the advertising itself starts to execute, post caching.

Video advertising within an application can be measured using several types of metrics:

Video Ad Impression (rendered) – This metric represents the count of the first frame of the video ad, post buffering if applicable.

Video Ad Impression (Viewable) – This metric applies certain thresholds to ad impressions that must be met (50% of the ad's pixels for 2 continuous seconds for video) in order to qualify as a viewable impression. These thresholds are designed to add greater assurance that there was an "opportunity to see" the ad by the user beyond assurance that the ad was properly served and received by the device. See the MRC Viewable Impression Measurement and MRC Mobile Viewable Impression

Measurement Guidelines for guidance on viewable video impressions.

Various metrics can be used to measure progress through either the video ad or the application content during the ad, which can act as a surrogate to user interest or engagement at a basic level.

Various metrics can be used for user interactions with the video ad or the application content during the ad, which again can act as a surrogate to user interest or engagement – for example, swipes, taps, movement or hovers, changing the size of the content, etc.

4.0 Application Development, Testing and Release Processes

The general internal controls present at the organization that develops or approves the application for release are a critical component of the overall operating effectiveness of advertising measurement associated with the application. These controls do not have to necessarily reside at the measurement application development/programming facility; however, certain levels of quality control should be present at some stage of application rollout. Ultimately it is the responsibility of the advertising measurement organization to ensure that proper testing and release processes are followed and that controlled development processes were employed in building the measurement application (which may be addressed via Terms and Conditions).

In general, the advertising measurement organization should have sufficient controls to ensure:

- Development of and changes to applications are authorized, tested and approved prior to being rolled out for User download (release). Segregation of versions should be maintained where advertising functionality has been changed.
- Access to application software associated with advertising, storage of ads, ad placement and serving functionality is restricted to authorized personnel (non User) and programs. Users should not have the ability to alter advertising content.
- The application is documented, and advertising associated functionality is documented.
- Only authorized served ad content is accepted as input by the application, regardless of whether that content is served real-time or stored for later use.
- Any calculations or data accumulation processes within the application have been tested for efficacy.
- Data transmissions from applications (whether real-time or batched) are complete, accurate and protected from modification.
- Errors and advertising data rejected for quality purposes is logged, evidence supporting the error is retained and errors are followed up on to correct potential cases of systematic or recurring issues.
- The application's performance is not materially affected by measurement integration.
- Measurement integration contemplates allowable trackers in application ad requests.
- Advertising related user-set parameters are documented, recorded and included in data transmissions back to the measurement organization if changed.

The use of SDKs for measurement may present some challenges in terms of administering and maintaining their use at scale. Furthermore, the potential for the presence of multiple SDKs within the same application may impact performance, user experience and data transmission. For this reason there may be value in the development of a single-source standard SDK by the industry that can be used by all parties. We encourage such development and would support a single source standard.

Furthermore, robust quality control for onboarding SDK users, updating and version control must be present. In SDK oriented measurement environments, the application developer or measurement organization should have sufficient confidence that the above controls are maintained for the SDK functionality. Development of this confidence can encompass a periodic review and/or testing conducted by the application developer. Another approach is for the SDK developer to itself be audited by a third party with some form of observable assurance provided such as certification, accreditation or a third-party CPA attestation. In this latter case, if the application developer is looking to become certified or accredited itself, the auditing organization can build a case for relying on the SDK assurance (depending on conditions of that assurance).

An API approach may involve the use of a third party that is responsible for implementation and ultimately the inputs into measurement. Measurers are required to conduct robust quality control procedures to onboard, vet and periodically review the use of third party inputs into measurement. Such quality controls procedures should include (but not be limited to) executing scripts in third party API environments to verify appropriate and accurate implementation both during onboarding and periodically on an ongoing basis. Use of API libraries and a process for validating the analysis of data collected by the API for publishers or vendors using standard agreed upon APIs is strongly encouraged. Third party providers of APIs may choose to have their functionality and API inputs centrally validated/examined to provide assurance to their measurement users. This approach could significantly reduce (but not eliminate) the testing required by measurement users.

Similar to the guidance on SDKs, there may be value in the development by the industry of a single-source standard API (using MRAID, VAST or a W3C output) that can be used by all parties. We encourage such development and would support a single source standard.

5.0 Enhancing Mobile Application Impression Tracking Accuracy

The following areas should be considered when creating audience measurement metrics for application and in evaluating these metrics:

5.1 Cache Busting

In some cases an ad can be rendered from a device's cache, and there is a risk that the client or server will not record the Ad Impression. Advertising instances should be counted across all ad request activity, regardless of whether the advertising or application functionality has been stored in cache. Accordingly, if cache techniques can impact Ad Impression counting, cache-busting techniques should be employed and are required for all sites and ad serving organizations. The following techniques are required:

1. HTTP or WAP Header Controls
The ad counter should employ standard headers on the response, in order to minimize the potential of caching a time-sensitive advertisement. These standard headers must include:
 - Expiry
 - Cache-Control
2. Unique String assignment techniques (such as random number or date/timestamp append with sufficient granularity) to identify unique serving occurrences of pages/ads.

Publishers and ad serving organizations should fully disclose their cache busting techniques to buyers and other users of their data.

5.2 Filtration for Invalid Traffic

Filtration of site or ad-serving transactions to remove invalid traffic is highly critical for accurate, consistent counting. All metrics subject to audit by MRC will be expected to comply with the MRC's Invalid Traffic and Filtration Guidelines Addendum. This includes ad impression metrics, which should be filtered for known General Invalid Traffic as required by those guidelines. Furthermore, application of Sophisticated Invalid Traffic detection processes is strongly encouraged for monetized traffic.

5.3 Segregation of Pre-fetch / Pre-render Advertising

As stated earlier, a valid ad impression count must happen after the initiation of retrieval of underlying page content and only when ad content has been loaded and at minimum begins to render. As such, Pre-fetch and Pre-render requests do not qualify for measurement as a valid ad impression unless ad content has been loaded and begins to render in response to a request by a user.

Tracked should still account for and exclude Pre-render situations to account for situations where a user did not navigate to a page.

Content owners or media seller organizations are encouraged to disclose the use of Pre-fetch and Pre-render requests (such as via self-announcing) consistent with the MRC Digital Advertising Measurement Technical and Transparency Best Practices (Appendix A). Measurement organization are encouraged to implement counting methodologies in such a way as to not subject the measurement events to being Pre-fetched or Pre-rendered to reduce or eliminate reliance on self-announcing.

5.4 Application Pre-loading

In certain cases, mobile applications may be configured to "Pre-load" ads (generally full-screen interstitials) whereby open and active applications load ad assets, but the app determines if the ad is shown at a later time (or if at all) such as upon specific user interaction or engagement. Pre-load requests do not qualify for measurement as a valid ad impression unless ad content has been loaded and begins to render in response to a request by a user. However, such Pre-loading may be indistinguishable from user-driven ad requests.

As such, a measurement vendor should only count these ads (pre-loaded in-app interstitials) a after execution of the last part of the application code that checks for a pre-loaded ad and then if present, chooses to display it, if known. Alternatively, pre-loaded interstitials should only be counted when displayed/visible.

5.5 Auto-Refreshed Ads

Auto-Refresh refers to the action of serving or changing advertising or content in an automatic manner. Auto-Refresh can be set directly by a user (user initiated) or set by a site or application without user interaction (site initiated).

Website/application content owners generally directly control the use of site initiated Auto-Refresh. External parties have significantly less ability to detect, measure and report on Auto-Refresh accurately, especially when using ad centric measurement approaches. As such, content owners or media seller organizations are encouraged to disclose the use of site initiated Auto-Refresh including parameters, settings and relative volumes or otherwise make this information available for use by measurement organizations (such as by being passed as

part of data transmissions) consistent with the MRC Digital Advertising Measurement Technical and Transparency Best Practices (Appendix A).

Measurement organizations are required to collect and utilize site initiated Auto-Refresh information disclosed or passed by content owners or media seller organizations. Measurement organizations are encouraged to develop techniques to detect and estimate site initiated Auto-Refresh if not otherwise disclosed or passed.

To the extent known by measurement organizations, the presence of site initiated Auto-Refresh should be disclosed to users of measurement data including the parameters and settings surrounding Auto-Refresh. Further, site initiated Auto-Refresh should utilize reasonable rates for the associated content type (sports site, news site, stock tickers, etc.) and include segregated disclosure of the Auto-Refresh counts if they are material to total ad impressions by campaign. User initiated Auto-Refresh is counted as a normal advertising impression.

See the *IAB Digital Video Measurement Guidelines* for further discussion of measurement and reporting issues related to Auto-Refresh.

5.6 Auto-Play Display Ads and Video

Auto-Play display Ad Impressions and Video (executed automatically outside of the intentions of the User) should be segregated for reporting purposes if material (exceeding 5% of reported impressions for the campaign for the reporting period). These auto-play impressions are valid to count; however, the uncertainty around engagement and the lack of User initiation of the impression cause the need for this segregation.

Content owners or media seller organizations are encouraged to disclose the use of Auto-Play including parameters, settings and relative volumes or otherwise make this information available for use by measurement organizations (such as by being passed as part of data transmissions) consistent with the MRC Digital Advertising Measurement Technical and Transparency Best Practices (Appendix A).

Measurement organizations are required to collect and utilize Auto-Play information disclosed or passed by content owners or media seller organizations. Measurement organizations are encouraged to develop techniques to detect the presence of Auto-Play if not otherwise disclosed or passed.

To the extent known by measurement organizations, the presence of Auto-Play should be disclosed to users of measurement data including the parameters and settings surrounding Auto-Play.

See the *IAB Digital Video Measurement Guidelines* for further discussion of measurement and reporting issues related to Auto-Play.

5.7 On-Line vs. Off-Line Activity

Ad Impression activity can be counted regardless of whether the advertising delivery occurred when the User was on-line or off-line, however the nature of Deferred Ad Impressions or other off-line activity should be described, quantified and segregated for reporting purposes.

Ad impressions resulting from off-line, stored, and later transmitted activity (“Deferred Ad Impressions”) must have occurred within the campaign reporting period. Also, the reported

ad impression must have occurred before the final bill for the campaign period, based on the pre-determined billing schedule as agreed to upfront between the buyer and seller. Thereafter, this activity may be reported on a segregated basis.

5.8 Integrated Application vs. Non-Integrated Application Ad Functionality and Measurement Differences

If application functionality, including advertising content available, advertising placements or other functions differs depending on the type of device being used, these differences should be described, quantified and segregated for reporting purposes. If these functionality differences are triggered by the compatibility of the application with certain authorized hardware this situation should also be described in the context of application coverage. Third party measurers may rely on buyer/seller users to provide these parameters.

5.9 Accumulating Compatible Advertising Across Mobile Platforms

Ad impressions and other metrics should be reported as homogeneously as possible if executions and ad content is variable across mobile platforms. Reporting should be segregated by placement. Mobile Application measurement should be segregated and distinct from Mobile Web.

5.10 Inactivity Considerations and Limits (Session Calculation Only)

An application Session is measured from the start of the application to the end-time of use of the application, as long as the application does not encounter inactivity (see Section 3.1.1) of a pre-defined duration. As noted in Sec. 3.1.1, these inactivity rules may vary based on the type of application involved; for instance, some applications are designed for long periods of inactivity (such as long-form video, or scoreboards, to name two examples), in which case a longer inactivity threshold may be more appropriate than in another situation where longer periods of inactivity are not normally to be expected. In all cases, inactivity rules applied must be fully documented and disclosed.

The mobile environment generally allows for a greater range of options for determining user activity than are available in traditional online environments, and these should be leveraged in making inactivity determinations. For instance, screen dims and darks, or screen touches, can be used in helping to make inactivity determinations.

5.11 Emerging Considerations

The following conditions are emerging in the application marketplace and therefore may contribute to changes in measurement metrics, methodology and disclosures. Application measurement organizations should consider these matters; the attribute of full disclosure is critical in emerging areas.

5.11.1 Targeting

The registration and self-identification nature of application usage lends itself to enhanced targeting functions. Development of these functions is encouraged; however, strong caution insofar as compliance with privacy regulations should be considered. Privacy regulations as they emerge should be monitored and staged for the application measurement organization as soon as known. Publicly available privacy policy documents are encouraged.

6.0 User Initiated Ad Actions or Information Gathering

Guidance on the measurement of user-initiated actions related to in-application advertising (as part of MMTF updates to IAB Click Measurement Guidelines as well as MRC efforts to promulgate guidelines for engagement measurement) will be propagated at a later time subsequent to the initial release of this document.

7.0 General Reporting Parameters

7.1 General Parameters

General reporting parameters (dayparts, weekparts, time zones, etc.) provide for consistency and comparability. These should be based on the logical application of information about the usage patterns of the medium.

In order to provide for more standardization in mobile application measurement reporting, the following general reporting parameters are recommended (although not explicitly required). Note that these are only several of the possible reporting parameters that may be used. If parameters in addition to these are reported, similar rules should be defined and applied.

7.2 Time

Day — 12:00 midnight to 12:00 midnight

Time Zone – Full disclosure of the time-zone used to produce the measurement report is required. In addition, it is preferable, although not a current compliance requirement, for certified publishers or ad servers to have the ability to produce audience reports in a consistent time-zone so buyers can assess activity across measurement organizations. For US-based reports it is recommended that reports be available on the basis of the Eastern time-zone, for non US-based reports this is recommended to be GMT.

Week — Monday through Sunday Weekparts — M-F, M-Sun, Sat, Sun, Sat-Sun

Month – Three reporting methods: (1) TV Broadcast month definition. In this definition, the Month begins on the Monday of the week containing the first full weekend of the month, (2) 4-week periods – (13 per year) consistent with media planning for other media, or (3) a calendar month. For financial reporting purposes, a month is defined as a calendar month.

Additional Recommendation: Dayparts – Mobile usage patterns need further analysis to determine the usefulness of establishing effective and logical standardized reporting dayparts. We encourage such analysis to determine the need for standardization of this measurement parameter.

7.3 Location

7.3.1 Traditional Geo-Location Methods

If information about the geographic location of the users is collected and reported, any limitations to the methods used should be disclosed. Location measurement and disclosure should be consistent with MRC location-based advertising guidance when finalized and where applicable.

7.3.2 Application Location Services

If information about the geographic location of the users is collected using application

location services (such as GPS-enabled user location determination, or another application-based means), and this information is used in reporting, the method used and any known limitations to it should be disclosed.

7.4 Segregating Non-Like Ad Content

For reporting purposes, measurements for a campaign should be segregated by the various types of ads included in the campaign. For instance, counts should be reported separately for ads within the campaign of different sizes or functionalities. Reporting should be segregated by placement. Mobile Application measurement should be segregated and distinct from Mobile Web and desktop measurement.

8.0 Disclosure Guidance

Media companies and ad serving organizations should disclose their ad impression recording process to buyers and other users of the ad impression count data via a description of methodology and other supplemental materials. An organization's methodology for accumulating mobile advertising measurements should be described to users of the data.

Specifically, the nature of measurements, methods of sampling used (if applicable), data collection methods employed, data editing procedures or other types of data adjustment or projection, calculation explanations, reporting standards (if applicable), reliability of results (if applicable) and limitations of the data should be included in the disclosure.

The following presents examples of the types of information disclosed.

Nature of Mobile Advertising Measurements

- Name Property, Domain, Site, Application (if applicable) Included in the Measurement
 - (Note: The name of the application is required in situations when reporting is done by application. In situations where reports cover network buys that include blind buys across multiple applications, the name(s) of the application(s) included in the measurement is not required to be disclosed.)
- Name of Measurement Report
- Type of Measurements Reported
 - Time Periods Included
 - Days Included
 - Basis for Measurement (including basis for determining ad rendering where applicable)
 - Geographic Areas
 - Significant Sub-Groupings of Data
 - Demographic categories
- Formats of Reported Data
- Special Promotions Impacting Measurements (where applicable)
- Nature of Auditing Applied and Directions to Access to Audit Report
- Sampling/Projections Used
 - Sampling Methods
 - Explanation of Projection Methods

Data Collection Methods Employed

- Method of Data Collection
 - Cache Busting Techniques Employed
 - Logging Method (including method(s) for determining ad is loaded and at minimum begins to render prior to counting, or method/basis for click measurement)
 - Logging Frequency (frequency and batching parameters)
 - Logging Capture Point (place in measurement transaction)
- SDK and API details and functionality (where applicable)
- Types of Data Collected
 - Contents of Log Files
- Procedures to Detect and Report Pre-fetch/Pre-render as well as Auto-Play/Auto-Refresh (where applicable)
- Contacts with Users (if applicable)
- Research on Accuracy of Basic Data
 - Latency Estimates
- Rate of Response (if applicable)

Editing or Data Adjustment Procedures

- Checking Records for Completeness
- Consistency Checks
- Accuracy Checks
- Rules for Handling Inconsistencies
- Circumstances for Discarding Data
- Filtration Procedures (considering IVT Addendum controls over protecting IVT techniques)
- Handling of Partial Data Records
 - Ascription Procedures (if used or applicable)

Computation of Reported Results

- Description of How Estimates are Calculated
 - Illustrations are desirable
- Weighting Techniques (if applicable)
- Verification or Quality Control Checks in Data Processing Operations
- Pre-Release Quality Controls
- Reprocessing or Error Correction Rules

Reporting Standards (if applicable)

- Requirements for Inclusion in Reports, Based on Minimum Activity Levels

Reliability of Results

- Sampling Error (if applicable)

Data retention rules (to make customers aware of the data retained in case of reprocessing)

- Maintaining sufficient data or processes that allow for audit trail

Limitations on Data Use

- Non-sampling Error
- Errors or Unusual Conditions Noted in Reporting Period
- Limitations of Measurements

9.0 Auditing Guidelines

9.1 General

Third-party independent auditing is encouraged for all ad-serving applications used in the buying and selling process. This auditing is recommended to include both counting methods and processing/controls as follows:

1. **Counting Methods:** Independent verification of activity for a defined period. Counting method procedures generally include a basic process review and risk analysis to understand the measurement methods, analytical review, transaction authentication, validation of filtration procedures and measurement recalculations. Activity audits can be executed at the campaign level, verifying the activity associated with a specific ad creative being delivered for performance measurement purposes.
2. **Processes/Controls:** Examination of the internal controls surrounding the ad delivery, recording and measurement process. Process auditing includes examination of the adequacy of site or ad-server applied filtration techniques.

Although audit reports can be issued as infrequently as once per year, some audit testing should extend to more than one period during the year to assure internal controls are maintained. Audit reports should clearly state the periods covered by the underlying audit testing and the period covered by the resulting certification.

9.2 U.S. Certification Recommendation

All ad-serving applications used in the buying and selling process are recommended to be certified as compliant with these guidelines at minimum annually. This recommendation is strongly supported by the American Association of Advertising Agencies (4As) and other members of the buying community, for consideration of measurements as “currency.”

Special Auditing Guidance for Outsourced Ad-Serving Software

Ad serving organizations that market ad serving/delivery software to publishers for use by the publisher’s IT infrastructure (i.e., “outsourced”) should consider the following additional guidance:

1. The standardized ad-serving software should be certified on a one-time basis at the ad serving organization, and this certification is applied to each customer. This centralized certification is required at minimum annually.

2. Each customer's infrastructure (and any modifications that customer has made to the ad serving software, if any) should be individually audited to assure continued functioning of the software and the presence of appropriate internal controls. Processes performed in the centralized certification applicable to the outsourced software are generally not re-performed. The assessment of customer internal controls (and modifications made to outsourced software, if any) is also recommended to be at minimum an annual procedure.

These certification procedures are only necessary for outsource clients who wish to present their measurements for use by buyers.

Special Auditing Guidance for Advertising Agencies or Other Buying Organizations

If buying organizations modify or otherwise manipulate measurements from certified publishers or ad-servers after receipt, auditing of these activities should be considered.

There are, in addition to MRC, a number of other certifiers and types and levels of certification available to ad serving organizations.

9.3 European/Additional Region/Country Certification Recommendation

The IAB, IAB Tech Lab, MMA and MRC encourage non-U.S. measurers of in-application advertising activity to adopt the practices spelled out in these guidelines. While certification regimes may vary on a country-by-country basis, we encourage measurers to be audited for compliance annually by independent, third-party auditing organizations.

10.0 Who We Are

Interactive Advertising Bureau (IAB)

The Interactive Advertising Bureau (IAB) empowers the media and marketing industries to thrive in the digital economy. Its membership is comprised of more than 650 leading media and technology companies that are responsible for selling, delivering, and optimizing digital advertising or marketing campaigns. The trade group fields critical research on interactive advertising, while also educating brands, agencies, and the wider business community on the importance of digital marketing. In affiliation with the IAB Tech Lab, it develops technical standards and best practices. IAB and the IAB Education Foundation are committed to professional development and elevating the knowledge, skills, expertise, and diversity of the workforce across the industry. Through the work of its public policy office in Washington, D.C., IAB advocates for its members and promotes the value of the interactive advertising industry to legislators and policymakers. Founded in 1996, the IAB is headquartered in New York City and has a San Francisco office.

Interactive Advertising Bureau Technology Laboratory (IAB Tech Lab)

The IAB Technology Laboratory is an independent, international, nonprofit research and development consortium charged with producing and helping companies implement global industry technical standards. Comprised of digital publishers and ad technology firms, as well as marketers, agencies, and other companies with interests in the interactive marketing arena, the IAB Tech Lab's goal is to reduce friction associated with the digital advertising and marketing supply chain, while contributing to the safe and secure growth of the industry. The organization's governing member companies include AppNexus, Extreme Reach, Google, GroupM, Hearst Magazines Digital Media, Integral Ad Science, LinkedIn, Moat, Pandora, PubMatic, Sonobi, Tremor Video, and Yahoo! JAPAN. Established in 2014, the IAB Tech Lab is headquartered in New York City with an office in

San Francisco.

About the Mobile Marketing Association

The MMA is the world's leading global non-profit trade mobile marketing association comprised of more than 800 member companies, from nearly fifty countries around the world. Our members hail from every faction of the mobile marketing ecosystem, including brand marketers, agencies, mobile technology platforms, media companies, operators and others. The MMA's mission is to accelerate the transformation and innovation of marketing through mobile, driving business growth with closer and stronger consumer engagement. Anchoring the MMA's mission are four core pillars; to cultivate inspiration by driving innovation for the Chief Marketing Officer; to build the mobile marketing capabilities for marketing organizations through fostering know-how and confidence; to champion the effectiveness and impact of mobile through research providing tangible ROI measurement; and to advocate for mobile marketers. Additionally, MMA industry-wide committees work collaboratively to develop and advocate global best practices and lead standards development.

About the Media Rating Council (MRC)

The Media Rating Council is a non-profit industry association established in 1963 comprised of leading television, radio, print and digital media companies, as well as advertisers, advertising agencies and trade associations, whose goal is to ensure measurement services that are valid, reliable and effective. Measurement services desiring MRC accreditation are required to disclose to their customers all methodological aspects of their service; comply with the MRC Minimum Standards for Media Rating Research as well as other applicable industry measurement guidelines; and submit to MRC-designed audits to authenticate and illuminate their procedures. In addition, the MRC membership actively pursues research issues they consider priorities in an effort to improve the quality of research in the marketplace. Currently approximately 110 research products are audited by the MRC. Additional information about MRC can be found at www.mediaratingcouncil.org.

APPENDIX A

MRC Digital Advertising Measurement Technical and Transparency Best Practices

Given some of the difficult measurement changes as well as the overall complexity of the advertising environment and the myriad of practices employed by participants in the digital advertising ecosystem, certain best practices should be followed to support valid, reliable and effective measurement.

Principles

- Participation is Voluntary
 - Applicable to Media Seller Organizations
 - Applicable to Measurement Vendors
 - Applicable to Media Buy-Side Organizations, See Specific Section
- Foster Accuracy and Transparency in Measurement
 - Exercise Professional Care in Discharging Measurement Related Activities
 - Continuous Improvement Mind-Set
- Seek to Accredit Measurement Functions that Impact Monetization, Use Accredited Products where Available
 - Comply with Applicable Industry Measurement Guidelines
 - If Accredited, also Comply with MRC Voluntary Code of Conduct (VCOG)
- Support IVT/Fraud Detection and Filtration Processes
 - MRC IVT Guidelines
 - TAG Activities
 - Fostering Centralized Tools and Communication about Fraud, IVT, Piracy, Misappropriated Content
 - Apply TAG Anti-Malware Principles

Measurement Interactions and Communication

- Transparency of Audience Extension Traffic Sourcing
 - Pass Information, Disclosure
- Transparency of Incentivized Browsing
 - Pass Information, Disclosure
- Collecting Measurement-Relevant Information
 - Pass Information, Disclosure
 - Auto-Play Video
 - Auto-Refresh
 - Origination Information in Proxy situations
 - Forced Duration Situations
 - Detection and Response Techniques Employed for Ad-Blocking
- Facilitate and Use Back-Up Creative, when Original Creative Cannot be Served
 - Segregate and Disclose Frequency
- Responsible Use of Browser/Application Tools
 - Page Visibility API
 - Flash Throttle (specific data elements)
 - Use of MRAID, VPAID and VAST and version
 - Protecting Security of Measurement Communication -- Encryption, etc.
 - Pre-fetch and Pre-render Considerations
 - Cache Busting Techniques (allowing random and timestamp append)
- Facilitate Unique Session and Click Identifiers
- Minimize Piggy-Back Tagging

- Reduce/Minimize Tagging-Related Latency
- Consideration of User Experience
 - Minimizing Intrusiveness
 - LEAN
 - Guard Rails Around Redirects, Page Takeover, Clutter
- Adopt Industry Infrastructure Standards, as Appropriate -- MRAID, VAST, VPAID, SafeFrame
- Adherence with Discrepancy Resolution and Communication Processes

Marketing with Best Digital Measurement Practices (applicable to media buy-side organizations)

- Encouraging Media Seller Partners and Measurement Vendors to Adhere to Best Practices
- Establishing Campaign Requirements that are Aligned with Best Practices

Compliance Representations

- Represent Compliance with this VCOC Accurately
- Escalation Process for Misrepresentation

Other Matters

- Responsibility for Updating of VCOC