Tracking Data

for Digital Out of Home

Technical Specifications

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1. The DMI Standards for Tracking Data

Market research data for Digital Out of Home (DOOH) media usually derive from major market media studies such as the „Public & Private Screens“ study by DMI / GfK. These market media studies are based on in-depth interviews of > 10.000 test persons selected for representation of the general population. The in-depth interviews generate performance data (gross and net contacts, gross and net reach), audience composition (demografics, family and employment status, household net income etc.), interests (topics, products), and media consumption (Online/Mobile, TV, Print etc.).

In the future these market data will increasingly be supplemented with real-time or near-time tracking data providing up-to-date information on the number of persons in front of a DOOH screen (frequency) and engagement with the ad creative (face-tracking, eye-tracking).

To ensure a swift adoption of real-time data for DOOH and seamless integration into market media studies, standards for tracking data are needed. Aim of these standards is to provide a general interface and data format to collect tracking data from a wide variety of sources (smartphones, LAN/Wifi, beacons, cameras etc.) and make them accessible to a wide variety of users (market research companies, market media studies, DSPs, SSPs, DMPs) without having to develop individual exchange formats.

2. Existing methodology

a. OpenRTB

While the need for Digital Out of Home (DOOH) advertising is unique, these specs will build-upon existing protocols. As other standards are already in place covering the basic protocols, these specifications will address the unique needs for Digital Out of Home. The foundation for these specs are the Open RTB 2.5 protocols.

More specifically, the Object Device (3.2.18) and the Object Geo (3.2.19) have been modified to accomodate requirements for DOOH tracking standards.

b. OpenRTB for DOOH

In collaboration with the industry, the Digital Media Institute has developed an OpenRTB for DOOH standard based on the OpenRTB standard. The DMI standards take into account specific requirements by and available data about the German Digital Out of Home market.

The OpenRTB framework enables custom extensions to be created to account for variations. The unique Digital Out of Home criteria have been included in the OpenRTB for DOOH standard via these extension.The DMI Standard for Tracking Data build upon and extend the OpenRTB for DOOH standard.

3. Standards for DOOH Tracking Data (Single Event)

To transmit tracking data for a single event (as opposed to batch data for multiple events; see: section 4) the following objects should be used:

c. Object Geo

In addition to standard data supplied within the OpenRTB context (see Appendix A: OpenRTB Objects), tracking data for DOOH should also provide the device venue of the DOOH screen as specified in the „position type“ in the Open RTB for DOOH standard (see: Appendix B: OpenRTB for Programmatic DOOH Objects).

Furthermore, tracking data for DOOH should – whenever possible – provide altitude information in addition to the standard (2-dimensional) location data (yielding 3-dimensional location data) to differentiate DOOH screens on e.g. different floors of a building (shopping malls, airpost, train stations etc.).

Finally, data about velocity, acceleration and inclination of the device used for tracking (smartphones) should be supplied (when available) to e.g. determine contact times with DOOH screens and to differentiate e.g. between car drivers and pedestrians when determining an audience composition.

DMI Standard for Tracking Data: Object **Geo**			
Attribute	Status	Type	Description
id	Required	float	Unique ID of device providing the tracking data
lat	Required	float	Latitude in WGS84 format (6-8 decimal places)
lon	Required	float	Longitude in WGS84 format (6-8 decimal places)
utcoffset	Required	integer	Local time as the number +/- of minutes from UTC.
lastfix	Required	integer	Number of seconds since this geolocation fix was established. Note that devices may cache location data across multiple fetches. Ideally, this value should be from the time the actual fix was taken.
type	Required	integer	Source of location data; recommended when passing lat/lon: 1 = GPS / Location Services 2 = Beacon 3 = LAN / Wifi / IP Adress

positiontype	Required	Integer	Descriptor identifying whether the device is in a fixed position (e.g. camera) vs a device that might move (e.g. smartphone): 0=fixed 1=move
altitude	Recommended	integer	Altitude of geolocation fix in meters above sea level
h_accuracy	Recommended	integer	Estimated location accuracy in meters; recommended when lat/lon are specified and derived from a device's location services (i.e., type = 1). Note that this is the accuracy as reported from the device. Consult OS specific documentation (e.g., Android, iOS) for exact interpretation.
v_accuracy	Recommended	integer	Estimated altitude accuracy in meters; recommended when lat/lon are specified and derived from a device's location services (i.e., type = 1). Note that this is the accuracy as reported from the device. Consult OS specific documentation (e.g., Android, iOS) for exact interpretation.
logfloor	Recommended	integer	Logical floor (in buildings) according to Google Maps: 0 = ground floor 1 = first floor -1 = first basement level etc.
v_type	Recommended	integer	Source of altitude data; recommended when passing lat/lon: 1 = GPS / Location Services 2 = Beacon 3 = LAN / Wifi / IP Adress 4 = Barometer (starting with iPhone 6)
velocity	Optional	float	Velocity of device at time of geolocation fix [m/s]
acceleration	Optional	float	Acceleration of device at time of geolocation fix [m/s^2]
rotation	Optional	float	Velocity of device at time of geolocation fix [grad/s]
incl_x	Optional	float	Inclination to x-axis of device at time of geolocation fix [grad]
incl_y	Optional	float	Inclination to y-axis of device at time of geolocation fix [grad]
incl_z	Optional	float	Inclination to z-axis of device at time of geolocation fix [grad]
ip	Optional	text	IP adress of device

ipservice	Optional	integer	Service or provider used to determine geolocation from IP address if applicable (i.e., type = 2): 1 = ip2location 2 = Neustar (Quova) 3 = MaxMind 4 = NetAcuity (Digital Element)
country	Optional	string	Country code using ISO-3166-1-alpha-3.
region	Optional	string	Region code using ISO-3166-2
regionfips104	Optional	string	Region of a country using FIPS 10-4 notation. While OpenRTB supports this attribute, it has been withdrawn by NIST in 2008.
metro	Optional	string	Germany: GKZ; USA: Google Metro Codes (see Appendix I for a link to the codes)
city	Optional	string	U.N. Code for Trade and Transport Locations (see Appendix C for a link to the codes)
zip	Optional	string	Germany: PLZ

d. Object Device

DMI Standard for Tracking Data: Object **Device**			
Attribute	Status	Type	Description
ip	Optional	string	IPv4 address closest to device.
ipv6	Optional	string	IP address closest to device as IPv6.
devicetype	Optional	integer	The general type of device (taken from OpenRTB standard; my need to be adjusted for tracking data standard): 1=Mobile/Tablet 2=Personal Computer 3=Connected TV 4=Phone 5=Tablet 6=Connected Device 7=Set Top Box
make	Optional	string	Device make (e.g., “Apple”).
model	Optional	string	Device model (e.g., “iPhone”)
os	Optional	string	Device operating system (e.g., “iOS”).

osv	Optional	string	Device operating system version (e.g., “3.1.2”).
hwv	Optional	string	Hardware version of the device (e.g., “5S” for iPhone 5S).
carrier	Optional	string	Carrier or ISP (e.g., “VERIZON”) using exchange curated string names which should be published to bidders a priori.
mccmnc	Optional	string	Mobile carrier as the concatenated MCC-MNC code (e.g., “310-005” identifies Verizon Wireless CDMA in the USA). Refer to https://en.wikipedia.org/wiki/Mobile_country_code for further examples. Note that the dash between the MCC and MNC parts is required to remove parsing ambiguity.
connectiontype	Optional	integer	Network connection type: 0=Unknown 1=Ethernet 2=WIFI 3=Cellular Network – Unknown Generation 4=Cellular Network – 2G 5=Cellular Network – 3G 6=Cellular Network – 4G
ifa	Optional	string	ID sanctioned for advertiser use in the clear (i.e., not hashed).
didsha1	Optional	string	Hardware device ID (e.g., IMEI); hashed via SHA1.
didmd5	Optional	string	Hardware device ID (e.g., IMEI); hashed via MD5.
dpidsha	Optional	string	Platform device ID (e.g., Android ID); hashed via SHA1.
dpidmd5	Optional	string	Platform device ID (e.g., Android ID); hashed via MD5.
macsha	Optional	string	MAC address of the device; hashed via SHA1.
macmd5	Optional	string	MAC address of the device; hashed via MD5.

4. Standards for DOOH Tracking Data (Batch)

Sometimes it may be necessary to transmit multiple tracking events accumulated over a period of time for a certain location (e.g. all smartphones tracked in a DOOH venue such as a supermarket over the course of an hour or a day) or region (e.g. in a 30 km radius around a city center or for certain zip codes).

In such cases the total number of tracking events in a given time (frequency) within a geofence is supplied with the following format.

Additional information describing the audience composition is optional. For IDs specifying e.g. age ranges or household income ranges refer to the OpenRTB for DOOH standard Appendix B (e.g. „Female 14-19“ = ID 2).

DMI Standard for Tracking Data (**Batch**): Object **Geo**			
Attribute	Status	Type	Description
id	Required	float	Unique ID of device providing the tracking data
lat	Required	float	Latitude [in WGS84 format, 6-8 decimal places] of geofence for which multiple tracking events (i.e. contacts with audience) have been recorded.
lon	Required	float	Longitude [in WGS84 format, 6-8 decimal places] of geofence for which multiple tracking events (i.e. contacts with audience) have been recorded.
radius	Required	integer	Radius [in meters] of geofence for which multiple tracking events (i.e. contacts with audience) have been recorded. Für DOOH locations (e.g. supermarkets or airports) standard location-specific radii defined by DMI / GfK should be used (see: http://dmi-org.com/downloads/Public%20&%20Private%20Screens%202016-2017%20-%20Methode.pdf page 45/46). If lat/lon specifies e.g. a metropolitan center a radius of e.g. 30 km ("30.000") might be specified, if all tracking events with a 30 km radius around the city center have been recorded.
utcoffset_start	Required	integer	Starting time of data collection (local time as the number +/- of minutes from UTC).
utcoffset_end	Required	integer	Ending time of data collection (local time as the number +/- of minutes from UTC).

region_id	Optional	string	May be used to define a geofence which cannot be given as a radius (e.g. ZIP code, city area or state). For Germany PLZ, GKZ, federal states or Nielsen areas may be specified: PLZ: 80333 GKZ (nach AGS): 03 2 54 021 = Hildesheim Nielsengebiet: IIIa Bundesland (nach AGS): 03 = Niedersachsen
count	Required	Integer	Number of tracking events recorded within specified time for specified geofence.
count_age1	Optional	integer	Number of tracking events "female; all ages" recorded within specified time for specified geofence.
count_age2	Optional	integer	Number of tracking events "female; age 14-19" recorded within specified time for specified geofence.
count_age3	Optional	integer	Number of tracking events "female; age 20-24" recorded within specified time for specified geofence.
count_age4	Optional	integer	Number of tracking events "female; age 25-29" recorded within specified time for specified geofence.
...			...
count_age10	Optional	integer	Number of tracking events "male; all ages" recorded within specified time for specified geofence.
count_age11	Optional	integer	Number of tracking events "male; age 14-19" recorded within specified time for specified geofence.
count_age12	Optional	integer	Number of tracking events "male; age 20-24" recorded within specified time for specified geofence.

5. Appendix A: OpenRTB Objects

Basis for the standards for DOOH tracking data are the following two Object definitions from the OpenRTB v2.5 standard:

e. Object Device (3.2.18)

This object provides information pertaining to the device through which the user is interacting. Device information includes its hardware, platform, location, and carrier data. The device can refer to a mobile handset, a desktop computer, set top box, or other digital device.

Attribute	Type	Description
ua	string; recommended	Browser user agent string.
geo	object; recommended	Location of the device assumed to be the user's current location defined by a Geo object (Section 3.2.19).
dnt	integer; recommended	Standard "Do Not Track" flag as set in the header by the browser, where 0 = tracking is unrestricted, 1 = do not track.
lmt	integer; recommended	"Limit Ad Tracking" signal commercially endorsed (e.g., iOS, Android), where 0 = tracking is unrestricted, 1 = tracking must be limited per commercial guidelines.
ip	string; recommended	IPv4 address closest to device.
ipv6	string	IP address closest to device as IPv6.
devicetype	integer	The general type of device. Refer to List 5.21.
make	string	Device make (e.g., "Apple").
model	string	Device model (e.g., "iPhone").
os	string	Device operating system (e.g., "iOS").
osv	string	Device operating system version (e.g., "3.1.2").
hwv	string	Hardware version of the device (e.g., "5S" for iPhone 5S).
h	integer	Physical height of the screen in pixels.
w	integer	Physical width of the screen in pixels.
ppi	integer	Screen size as pixels per linear inch.
pxratio	float	The ratio of physical pixels to device independent pixels.
js	integer	Support for JavaScript, where 0 = no, 1 = yes.
geofetch	integer	Indicates if the geolocation API will be available to JavaScript code running in the banner, where 0 = no, 1 = yes.
flashver	string	Version of Flash supported by the browser.
language	string	Browser language using ISO-639-1-alpha-2.

carrier	string	Carrier or ISP (e.g., "VERIZON") using exchange curated string names which should be published to bidders *a priori*.
mccmnc	string	Mobile carrier as the concatenated MCC-MNC code (e.g., "310-005" identifies Verizon Wireless CDMA in the USA). Refer to https://en.wikipedia.org/wiki/Mobile_country_code for further examples. Note that the dash between the MCC and MNC parts is required to remove parsing ambiguity.
connectiontype	integer	Network connection type. Refer to List 5.22.
ifa	string	ID sanctioned for advertiser use in the clear (i.e., not hashed).
didsha1	string	Hardware device ID (e.g., IMEI); hashed via SHA1.
didmd5	string	Hardware device ID (e.g., IMEI); hashed via MD5.
dpidsha1	string	Platform device ID (e.g., Android ID); hashed via SHA1.
dpidmd5	string	Platform device ID (e.g., Android ID); hashed via MD5.
macsha1	string	MAC address of the device; hashed via SHA1.
macmd5	string	MAC address of the device; hashed via MD5.
ext	object	Placeholder for exchange-specific extensions to OpenRTB.

BEST PRACTICE: There are currently no prominent open source lists for device makes, models, operating systems, or carriers. Exchanges typically use commercial products or other proprietary lists for these attributes. Until suitable open standards are available, exchanges are highly encouraged to publish lists of their device make, model, operating system, and carrier values to bidders.

BEST PRACTICE: Proper device IP detection in mobile is not straightforward. Typically it involves starting at the left of the `x-forwarded-for` header, skipping private carrier networks (e.g., `10.x.x.x` or `192.x.x.x`), and possibly scanning for known carrier IP ranges. Exchanges are urged to research and implement this feature carefully when presenting device IP values to bidders.

f. Object Geo (3.2.19)

This object encapsulates various methods for specifying a geographic location. When subordinate to a `Device` object, it indicates the location of the device which can also be interpreted as the user's current location. When subordinate to a `User` object, it indicates the location of the user's home base (i.e., not necessarily their current location).

The `lat`/`lon` attributes should only be passed if they conform to the accuracy depicted in the `type` attribute. For example, the centroid of a geographic region such as postal code should not be passed.

Attribute	Type	Description
lat	float	Latitude from -90.0 to +90.0, where negative is south.
lon	float	Longitude from -180.0 to +180.0, where negative is west.
type	integer	Source of location data; recommended when passing `lat`/`lon`. Refer to List 5.20.

accuracy	integer	Estimated location accuracy in meters; recommended when lat/lon are specified and derived from a device's location services (i.e., type = 1). Note that this is the accuracy as reported from the device. Consult OS specific documentation (e.g., Android, iOS) for exact interpretation.
lastfix	integer	Number of seconds since this geolocation fix was established. Note that devices may cache location data across multiple fetches. Ideally, this value should be from the time the actual fix was taken.
ipservice	integer	Service or provider used to determine geolocation from IP address if applicable (i.e., type = 2). Refer to List 5.23.
country	string	Country code using ISO-3166-1-alpha-3.
region	string	Region code using ISO-3166-2; 2-letter state code if USA.
regionfips104	string	Region of a country using FIPS 10-4 notation. While OpenRTB supports this attribute, it has been withdrawn by NIST in 2008.
metro	string	Google metro code; similar to but not exactly Nielsen DMAs. See Appendix A for a link to the codes.
city	string	City using United Nations Code for Trade & Transport Locations. See Appendix A for a link to the codes.
zip	string	Zip or postal code.
utcoffset	integer	Local time as the number +/- of minutes from UTC.
ext	object	Placeholder for exchange-specific extensions to OpenRTB.

6. Appendix B: OpenRTB for Programmatic DOOH Objects

g. Object Device

The OpenRTB device attributes need to be appended with the device venue:

Attribute	Status
ua	Recommended
geo	Required
dnt	Will not be used
lmt	Will not be used
ip	Recommended
ipv6	Recommended
devicetype	Recommended
make	Optional
model	Optional
os	Optional
osv	Optional
hwv	Optional
hwv	Optional
w	Optional
ppi	Optional
pxratio	Optional
js	Optional
geofetch	Optional
flashver	Optional
delivery	Optional
language	Optional
carrier	Optional
connectiontype	Optional
ifa	Optional
didsha1	Optional
didmd5	Optional
dpidsha	Optional
dpidmd5	Optional
macsha	Optional
macmd5	Optional

Extension: DOOH

Attribute	Description	Type	Status
devicevenue	This identifies the venue of the console.	Integer	Required.

Note:

- When the „buid“ attribute in Object BidRequest is used (see DMI OpenRTB for Programmatic DOOH standard), the „devicevenue“ attribute is redundant, since the respective information is passed on (together with other information) in the „buid“ attribute.
- For a standardized list of DOOH venues refer to DMI OpenRTB for Programmatic DOOH standard, Appendix A.

h. Object Geo

The device attributes need to be appended with the position type to differentiate between fixed and moving DOOH screens:

Attribute	Status	Notes
lat	Required	
lon	Required	
type	Required	Use “Mobile Location Services”
accuracy	Recommended	
lastfix	Optional	
ipservice	Optional	
country	Recommended	Country code using ISO-3166-1-alpha-3.
region	Recommended	Region code using ISO-3166-2
regionfips104	Optional	
metro	Recommended	Germany: GKZ; USA: Google Metro Codes (see Appendix I for a link to the codes)
city	Recommended	U.N. Code for Trade and Transport Locations (see Appendix I for a link to the codes)
zip	Recommended	Germany: PLZ
utcoffset	Recommended	

Extension: DOOH

Attribute	Description	Type	Status
positiontype	Descriptor identifying whether the media console is in a fixed position (ex. billboard, elevator, mall) vs a console that might move (ex. taxi)	Integer	Required. (0=fixed, 1=move)

7. Appendix C: Additional Information

- Google Metro Codes

https://developers.google.com/adwords/api/docs/appendix/geotargeting?csw=1

- U.N. Code for Trade and Transport Locations:

http://www.unece.org/cefact/locode/service/location.htm