RTB Project

OpenRTB API Specification Version 2.2

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Introduction

The RTB Project, formerly known as the OpenRTB Consortium, assembled in November 2010 to develop a new API specification for companies interested in an open protocol for the automated trading of digital media across a broader range of platforms, devices, and advertising solutions. This document is the culmination of those efforts.

About the IAB's Networks & Exchanges Committee:
The IAB Networks & Exchanges Committee is comprised of senior leaders of ad networks and ad exchanges member companies. The committee is dedicated to furthering the interests of digital ecosystem in today's complex ad marketplace. Committee objectives are to foster the highest standards of professionalism and accountability in relationships with publishers, advertisers, intermediaries, and the agency community, to develop programs that enable revenue growth, and to create best practices that protect consumers and the industry.

The RTB Project is a working group within the IAB Advertising Technology Council.

This document can be found at www.iab.net

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Before You Get Started

This specification contains a very detailed explanation of a real-time bidding interface. Not all objects are required, and each object may contain a number of optional parameters. To assist a first time reader of the specification, we have indicated which fields are essential to support a minimum viable real time bidding interface for various scenarios (banner, video, mobile, etc.).

A minimal viable interface should include the **required** and **recommended** parameters, but the scope for these parameters may be limited to specific scenarios. In these cases, the scope will be qualified with the applicable scenarios (e.g., **required for video impressions** and **recommended for native apps**). Conversely, if the scope is not qualified, it applies to all scenarios.

Optional parameters may be included to ensure maximum value is derived by the parties.

Required parameters must be included.

Recommended parameters should be included unless there is a compelling reason to omit them.

Optional parameters may be included at your discretion.

Field	Scope	Type	Default	Description
id	required	string	-	Unique ID of the bid request, provided by the exchange.
version	required	string	-	Open RTB version
imp	required	array of objects	-	Array of impression objects. Multiple impression auctions may be specified in a single bid request. At least one impression is required for a valid bid request.
site	recommended for websites	object	-	See **Site Object**
app	recommended for native apps	object	-	See **App Object**
device	recommended	object	-	See **Device Object**
user	recommended	object	-	See **User Object**
at	optional	string	2	Auction Type. If "1", then first price auction. If "2", then second price auction. Additional auction types can be defined as per the exchange's business rules.
tmax	optional	integer	-	Maximum amount of time in milliseconds to submit a

IMPORTANT: Since **recommended** parameters are not required, they may not be available from all supply sources. It is suggested that all parties to OpenRTB transaction complete the integration checklist on the next page to identify which parameters the supply side supports in the bid request, and which parameters the demand side requires for ad decisioning.

Integration Checklist

☐ **[Company Name]** is a **supply source**, and these are the objects/parameters **supported** in the bid request

☐ **[Company Name]** is a **demand source**, and these are the objects/parameters **required** for ad decisioning

Supported Scenarios:

In-Browser:	In-App (typically mobile):	Other:
☐ Banners ☐ Video	☐ Banners ☐ Video	☐ Please Specify:

Supported Objects/Parameters:

Object Name	Supported?	List Recommended Parameters **NOT** Supported	List Optional Parameters Supported
Bid Request Object	☒		
Impression Object	☒		
Banner Object	☐		
Video Object	☐		
Site Object	☐		
App Object	☐		
Content Object	☐		
Device Object	☐		
User Object	☐		
Publisher Object	☐		
Producer Object	☐		
Geo Object	☐		
Data Object	☐		
Segment Object	☐		

1 Introduction

1.1 Mission / Overview

The mission of the OpenRTB project is to spur greater growth in the Real-Time Bidding (RTB) marketplace by providing open industry standards for communication between buyers of advertising and sellers of publisher inventory. There are several aspects to these standards including but not limited to the actual real-time bidding protocol, information taxonomies, offline configuration synchronization, and many more.

This document specifies a standard for the Real-Time Bidding Interface that has grown out of previous OpenRTB collaboration on the "blocklist project" and the "OpenRTB Mobile Project. These protocol standards aim to simplify the connection between suppliers of publisher inventory (i.e., exchanges, networks working with publishers, and sell-side platforms) and competitive buyers of that inventory (i.e., bidders, demand side platforms, or networks working with advertisers).

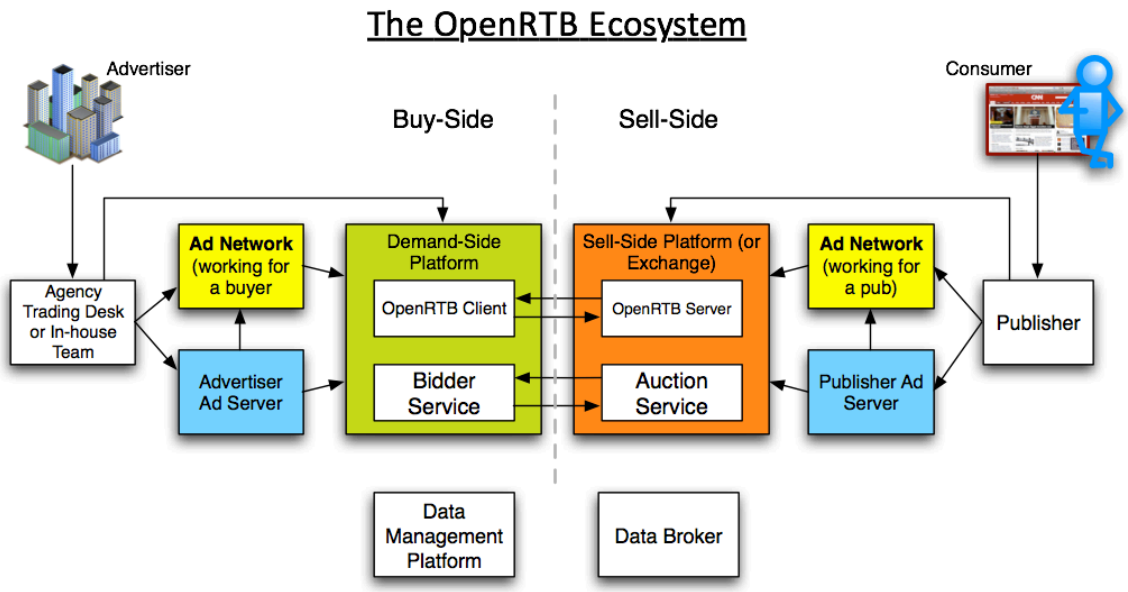


Figure 1: High-level communications diagram between parties in the Open RTB Ecosystem. OpenRTB supports both "offline" batch synchronization of information and "online" real-time synchronization.

The protocols outlined in this document should be considered guidelines, not absolute rules. The overall goal of OpenRTB is to create a *lingua franca* for communicating between buyers and sellers. The intent is **not** to regulate exactly how each business operates. As a project, we aim to make integration between parties easier, so that innovation can happen at a deeper-level at each of the businesses in the ecosystem.

1.2 Credits / Project History

OpenRTB was launched as a pilot project between three demand-side platforms (DataXu, MediaMath, Turn) and three sell-side platforms (Admeld, PubMatic, and the Rubicon Project) in November 2010. The first goal was to standardize communication between parties for exchanging blocklists. Version 1.0 of the OpenRTB blocklist specification was released in December 2010.

After a positive response from the industry, Nexage. Inc. approached the OpenRTB project with a proposal to create an API specification for OpenRTB for mobile advertising. The mobile subcommittee was formed between companies representing the buy-side (DataXu, Fiksu, and [X+1]) and companies representing the sell-side (Nexage, Pubmatic, and Smaato). This project resulted in the OpenRTB for mobile specification 1.0 that was released in February 2011.

Following the release of the mobile specification, a video subcommittee was formed with video ad exchanges (BrightRoll and Adap.tv) collaborating with DataXu and ContextWeb to incorporate support for video. The goal was to incorporate support for display, video and mobile in one document. This effort resulted in version 2.0 of OpenRTB, which was released for comment on June 30, 2011. As of June 30th, over 80 companies from the advertising technology community are participating in the project.

1.3 Resources

Resource	Location
OpenRTB Website	http://openrtb.info
OpenRTB Project Page	http://code.google.com/p/openrtb/
User Mailing List	http://groups.google.com/group/openrtb-user
Developer / Product Manager Mailing List	http://groups.google.com/group/openrtb-dev

1.4 Version History

OpenRTB Display BlockList Branch:

1.0 – Original Release of OpenRTB blocklist specifications

1.1 – Minor edits to include real-time exchange of creative attributes

1.2 – (proposed) Publisher Preferences API doc

OpenRTB Real-Time Bidding API

1.0 – Original Release of OpenRTB Mobile API

1.9 – Draft release, including display, mobile, and video in a single specification

2.0 –Combines display, mobile, and video standards into a single specification

2.1 – Fully backward compatible revisions for QAG Compliance and bugs

2.2 – New enhancements for Private Marketplaces via Deal ID, Video, Mobile, and regulatory signals.

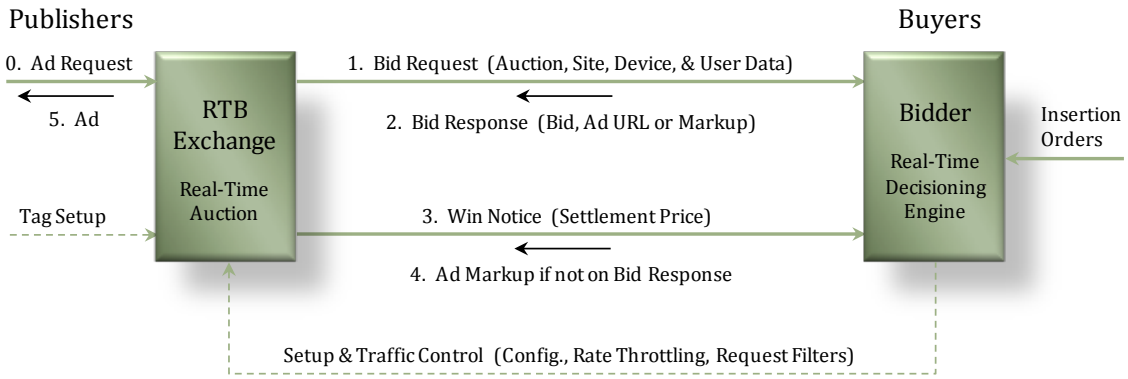
1.5 Terminology

The following terms are used throughout this document specifically in the context of the OpenRTB Interface and this specification.

Term	Definition
RTB	Bidding for individual impressions in real-time (i.e., while a consumer is waiting).
Exchange	A service that conducts an auction among bidders per impression.
Bidder	An entity that competes in real-time auctions to acquire impressions.
Seat	An entity that wishes to obtain impressions and uses bidders to act on their behalf.
Publisher	An entity that operates one or more sites.
Site	Ad supported content including web and applications unless otherwise specified.
DealID	An identifier representing a pre-arranged agreement between a Publisher and a Seat to purchase impressions.

2 RTB Basics

The following figure illustrates the OpenRTB interactions between an exchange and its bidders. Ad requests originate at publisher sites. For each inbound ad request, bid requests are broadcast to bidders, responses are evaluated under prevailing auction rules, the winner is notified, and ad markup is returned. This specification focuses on the real-time interactions of bid request and response and the win notice and response. Other interactions (e.g., block list synchronization, traffic control) are candidates for future initiatives or are already defined by OpenRTB.



2.1 Transport

The base protocol between an exchange and its bidder is HTTP. Specifically, HTTP POST is required for bid requests to accommodate greater payloads than HTTP GET and facilitate the use of binary representations. Win notices may be either HTTP POST or HTTP GET at the discretion of the exchange. All calls should return HTTP code 200 except for an empty bid response (i.e., the recommended method of specifying "no bid"), which should return HTTP code 204.

> **BEST PRACTICE:** One of the simplest and most effective ways of improving connection performance is to enable HTTP Persistent Connections, also known as HTTP Keep-Alive. This has a profound impact on overall performance by reducing connection management overhead as well as CPU utilization on both sides of the interface.

2.2 Security

SSL (Secure Sockets Layer) is not required for compliance since these are server-to-server calls, which can be protected in other ways. Furthermore, SSL is not recommended due to the additional processing overhead.

2.3 Data Format

JSON (JavaScript Object Notation) is the suggested format for bid request and bid response data payloads. JSON was chosen for its combination of human readability and compactness. The data payloads are described in section 3 and section 4.

An exchange may offer additional representations to bidders who may prefer them. These might include a compressed form of JSON, XML, Apache Avro, ProtoBuf, Thrift, and many others.

The bid request specifies the representation as a mime type using the Content-Type HTTP header. The mime type for the standard JSON representation is "application/json" as shown. The format of the bid response must be the same as the bid request.

```
Content-Type: application/json
```

If alternative binary representations are used, the exchange or SSP should specify the Content-Type appropriately. For example: "Content-Type: avro/binary" or "Content-Type: application/x-protobuf". If the content-type is missing, the bidder should assume the type is application/json, unless a different default has been selected by an exchange.

As a convention, the absence of an attribute has a formal meaning. In most cases, this indicates that the value is unknown, unless otherwise specified.

2.4 OpenRTB Version HTTP Header

The OpenRTB Version should be passed in the header of a bid request with a custom header parameter. This will allow bidders to recognize the version of the message contained before attempting to parse the request.

```
x-openrtb-version: 2.2
```

This version should be specified as major.minor, for example: 2.0 or 2.1. First or second level increments on the version are changes to the protocol. In general, second-level changes should be backwards compatible, whereas first level changes need not be backwards compatible. Any third level revisions (such as 2.0.1) should not change the protocol itself, only descriptions and notes that don't affect the protocol content. Third level versions should not be included in this header.

2.5 Privacy by Design

The OpenRTB project fully supports privacy policies as specified by buyers and sellers of advertising. In particular OpenRTB supports do-not-track headers, and the ability to pass user preferences from sellers to buyers through the User Object (see Section 3.3.12).

2.6 Relationship to IAB Quality Assurance Guidelines

OpenRTB is fully compatible with the IAB Quality Assurance Guidelines (QAG) available here: http://www.iab.net/ne_guidelines. In particular the taxonomies used in this specification are derived from the QAG.

2.7 Customization and Extensions

The OpenRTB spec allows for exchange specific customization and extensions of the specification.. Any object may contain extensions. In order to keep extension fields consistent across platforms, they should consistently be named ‘ext’.

3 Bid Request Details

RTB transactions are initiated when an exchange or other supply source sends a bid request to a bidder. The bid request consists of a bid request object, at least one impression object, and may optionally include additional objects providing impression context.

3.1 Object List

Following is the object list for the bid request. Click on the object name to jump to the object definition.

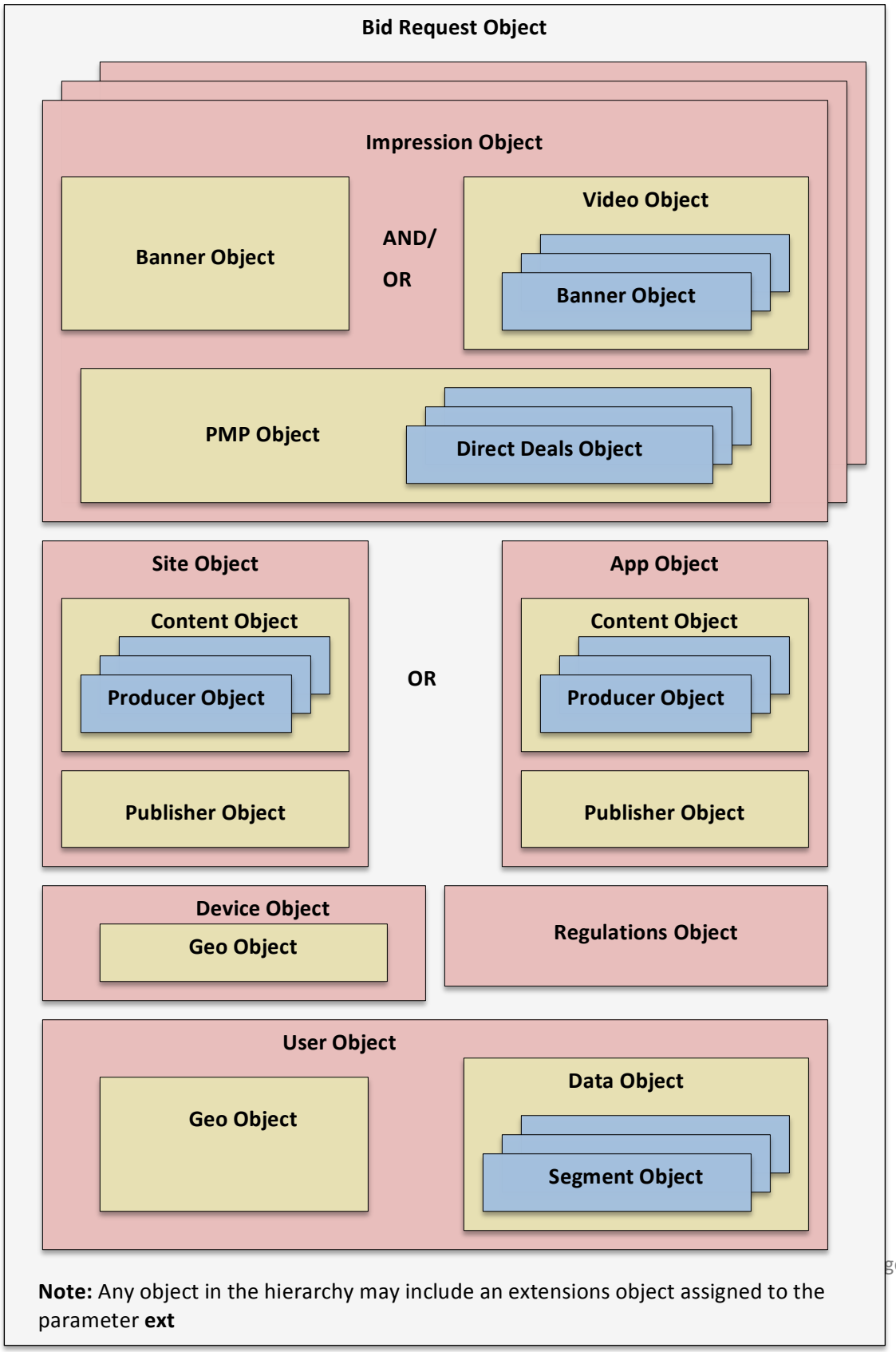
Object Name	Scope	Notes
Bid Request Object	**required**	Top-level object.
Impression Object	**required**	At least one impression object is required in a bid request object.
Banner Object	**required for banner impressions**	A banner object typically describes an ad opportunity for banner, rich media or in-banner video inventory. **IMPORTANT:** An impression object must include a banner or a video object, but it may include both. **In most cases, only one object type will be included** (depending on whether the ad opportunity is for banner or in-stream video inventory). However, some publisher implementations may represent the same impression as both banner and video inventory. In this case, the inventory is represented by both a banner and a video object. **It is expected that each bid within a response will only pertain to one object type** (i.e., the bid response should either be for the inventory described by the banner object or the video object, not both).
Video Object	**required for video impressions**	A video object typically describes an ad opportunity for in-stream video inventory (including linear pre-roll, mid-roll and post-roll, and non-linear overlays). Please note, in-banner video is typically represented by the banner object. **IMPORTANT:** An impression object must include a banner or a video object, but it may include both. **In most cases, only one object type will be included** (depending on whether the ad

		opportunity is for banner or in-stream video inventory). However, some publisher implementations may represent the same impression as both banner and video inventory. In this case, the inventory is represented by both a banner and a video object. **It is expected that each bid within a response will only pertain to one object type** (i.e., the bid response should either be for the inventory described by the banner object or the video object, not both).
Site Object	**recommended for websites**	Either a site or app object may be included – not both. Neither is required.
App Object	**recommended for native apps**	Either a site or app object may be included – not both. Neither is required.
Content Object	**recommended**	This object describes the content of a site or app, depending on which object it is embedded in.
Device Object	**recommended**	This object describes the device the ad impression will be delivered to (e.g., mobile phone, computer, set top box, etc.) and its capabilities (e.g., flash support).
User Object	**recommended**	This object describes the user, and may include unique identifiers for the user.
Publisher Object	optional	This object describes the publisher of a site or app, depending on which object it is embedded in.
Producer Object	optional	This object describes the producer of content object, which might be different from the publisher of the content of the page. This object is useful in the case of syndicated content, such as embedded videos, for example.
Geo Object	optional	Depending on the parent object, this object describes the current geographic location of the device (e.g., based on IP address or GPS), or it may describe the home geo of the user (e.g., based on registration data).
Data Object	optional	The data object is a child of the user object and describes a data source. Once segment objects are embedded, data about the user may be passed to bidders.

Segment Object	optional	The segment object is a child of the data object, and describes data segments applicable to the user for the given data provider.
Regulations Object	optional	This object describes any legal, governmental or industry regulations governing the request.
PMP Object	optional	This object conveys a private marketplace of deals struck between buyers and sellers.
Direct Deal Object	optional	This object constitutes a deal struck *a priori* between a buyer and a seller and indicates that this impression is available under the terms of that deal.
Extensions	Optional	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification. Any object may contain extensions. In order to keep extension fields consistent across platforms, they should consistently be named 'ext'.

3.2 Object Hierarchy

Following is the object hierarchy for a bid request.



Note: Any object in the hierarchy may include an extensions object assigned to the parameter **ext**

IMPORTANT: An impression object must include a banner or a video object, but it may include both. **In most cases, only one object type will be included** (depending on whether the ad opportunity is for banner or in-stream video inventory). However, some publisher implementations may represent the same impression as both banner and video inventory. In this case, the inventory is represented by both a banner and a video object. **It is expected that each bid within a response will only pertain to one object type** (i.e., the bid response should either be for the inventory described by the banner object or the video object, not both). See section **3.1** for more information about the objects.

3.3 Object Definitions

Following are definitions of the various objects involved in a bid request.

3.3.1 Bid Request Object

The top-level bid request object contains a globally unique bid request or auction ID. This "id" attribute is required as is at least one "imp" (i.e., impression) object. Other attributes are optional since an exchange may establish default values.

The **Default** column dictates how optional parameters should be interpreted if explicit values are not provided.

Field	Scope	Type	Default	Description
id	**required**	string	-	Unique ID of the bid request, provided by the exchange.
imp	**required**	array of objects	-	Array of impression objects. Multiple impression auctions may be specified in a single bid request. At least one impression is required for a valid bid request.
site	**recommended for websites**	object	-	See Site Object
app	**recommended for native apps**	object	-	See App Object
device	**recommended**	object	-	See Device Object
user	**recommended**	object	-	See User Object

at	optional	int	2	Auction Type. If “1”, then first price auction. If “2”, then second price auction. Additional auction types can be defined as per the exchange’s business rules. Exchange specific rules should be numbered over 500.
tmax	optional	integer	-	Maximum amount of time in milliseconds to submit a bid (e.g., 120 means the bidder has 120ms to submit a bid before the auction is complete). If this value never changes across an exchange, then the exchange can supply this information offline.
wseat	optional	array of strings	-	Array of buyer seats allowed to bid on this auction. Seats are an optional feature of exchange. For example, [“4”,”34”,”82”,”A45”] indicates that only advertisers using these exchange seats are allowed to bid on the impressions in this auction.
allimps	optional	integer	0	Flag to indicate whether Exchange can verify that all impressions offered represent all of the impressions available in context (e.g., all impressions available on the web page; all impressions available for a video [pre, mid and postroll spots], etc.) to support road-blocking. A true value should only be passed if the exchange is aware of all impressions in context for the publisher. “0” means the exchange cannot verify, and “1” means that all impressions represent all impressions available.
cur	optional	array of strings		Array of allowed currencies for bids on this bid request using ISO-4217 alphabetic codes. If

				only one currency is used by the exchange, this parameter is not required.
bcat	optional	array of strings	-	Blocked Advertiser Categories. Note that there is no existing categorization / taxonomy of advertiser industries. However, as a substitute exchanges may decide to use IAB categories as an approximation (See Table 6.1 Content Categories)
badv	optional	array of strings	-	Array of strings of blocked top-level domains of advertisers. For example, {“company1.com”, “company2.com”}.
regs	optional	object	-	This object is a container for any legal, governmental or industry regulations in force for the request.
ext	optional	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.2 Impression Object

The “imp” object describes the ad position or impression being auctioned. A single bid request can include multiple “imp” objects, a use case for which might be an exchange that supports selling all ad positions on a given page as a bundle. Each “imp” object has a required ID so that bids can reference them individually. An exchange can also conduct private auctions by restricting involvement to specific subsets of seats within bidders.

The **Default** column dictates how optional parameters should be interpreted if explicit values are not provided.

Field	Scope	Type	Default	Description
Id	**required**	string	-	A unique identifier for this impression within the context of the bid request (typically, value starts with 1, and increments up to n for n

				impressions).
banner	**required for banner impressions**	object	-	A reference to a banner object. Either a banner or video object (or both if the impression could be either) must be included in an impression object. See Banner Object.
video	**required for video impressions**	object	-	A reference to a video object. Either a banner or video object (or both if the impression could be either) must be included in an impression object. See Video Object.
displaymanager	**recommended for video and native apps**	string	-	Name of ad mediation partner, SDK technology, or native player responsible for rendering ad (typically video or mobile). Used by some ad servers to customize ad code by partner.
displaymanagerver	**recommended for video and native apps**	string	-	Version of ad mediation partner, SDK technology, or native player responsible for rendering ad (typically video or mobile). Used by some ad servers to customize ad code by partner
instl	optional	integer	0	1 if the ad is interstitial or full screen; else 0 (i.e., no).
tagid	optional	string		Identifier for specific ad placement or ad tag that was used to initiate the auction. This can be useful for debugging of any issues, or for optimization by the buyer.
bidfloor	optional	float	0	Bid floor for this impression (in CPM of bidfloorcur).
bidfloorcur	optional	string	USD	If bid floor is specified and multiple currencies supported per bid request, then currency should be specified here using ISO-4217 alphabetic codes. Note, this may be different

				from bid currency returned by bidder, if this is allowed on an exchange.
iframebuster	optional	array of string	None	Array of names for supported iframe busters. Exchange specific.
pmp	optional	object		A reference to the PMP object containing any Deals eligible for the impression object. See the PMP object definition.
ext	optional	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.3 Banner Object

The "banner" object must be included directly in the impression object if the impression offered for auction is display or rich media, or it may be optionally embedded in the video object to describe the companion banners available for the linear or non-linear video ad. The banner object may include a unique identifier; this can be useful if these IDs can be leveraged in the VAST response to dictate placement of the companion creatives when multiple companion ad opportunities of the same size are available on a page.

The **Default** column indicates how optional parameters should be interpreted if explicit values are not provided.

Field	Scope	Type	Default	Description
w	**recommended**	integer	-	Width of the impression in pixels. Since some ad types are not restricted by size this field is not required, but it's highly recommended that this information be included when possible.
h	**recommended**	integer	-	Height of the impression in pixels. Since some ad types are not restricted by size this field is not

				required, but it's highly recommended that this information be included when possible.
wmin	optional	integer	-	Minimum width of the impression in pixels. If included, it indicates that a range of sizes is allowed with this minimum width and "w" is taken as recommended. If not included, then "w" should be considered an exact requirement.
hmin	optional	integer		Minimum height of the impression in pixels. If included, it indicates that a range of sizes is allowed with this minimum height and "h" is taken as recommended. If not included, then "h" should be considered an exact requirement.
id	**recommended when subordinate to a video object**	string	-	Unique identifier for this banner object. Useful for tracking multiple banner objects (e.g., in companion banner array). Usually starts with 1, increasing with each object. Combination of impression id banner object should be unique.
pos	optional	integer	-	Ad Position. Use Table **6.5**
btype	optional	array of integers	All types are allowed	Blocked creative types. See Table **6.2** Banner Ad Types. If blank, assume all types are allowed.
battr	optional	array of integers	All types are allowed	Blocked creative attributes. See Table **6.3** Creative Attributes. If blank assume all types are allowed.
mimes	optional	array of strings	All types are allowed	Whitelist of content MIME types supported. Popular MIME types include, but are not limited to "image/jpg", "image/gif" and "application/x-shockwave-flash".
topframe	optional	integer	0	Specify if the banner is delivered in the top frame or in an iframe. "0" means it is not in the top frame, and "1" means that it is.
expdir	optional	array of	Not	Specify properties for an

		integers	expandable	expandable ad. See Table **6.11** Expandable Direction for possible values.
api	optional	array of integers	None	List of supported API frameworks for this banner. (See Table **6.4** API Frameworks). If an API is not explicitly listed it is assumed not to be supported.
ext	optional	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.4 Video Object

The "video" object must be included directly in the impression object if the impression offered for auction is an in-stream video ad opportunity.

The **Default** column indicates how optional parameters should be interpreted if explicit values are not provided.

Note that for the video object, many of the fields are non-essential for a minimally viable exchange interfaces. These parameters do not necessarily need to be specified to the bidder, if they are always the same for all impression, of if the exchange chooses not to supply the additional information to the bidder.

Field	Scope	Type	Default	Description
mimes	**required**	array of strings	-	Content MIME types supported. Popular MIME types include, but are not limited to "video/x-ms-wmv" for Windows Media, and "video/x-flv" for Flash Video.
minduration	**required**	integer	-	Minimum video ad duration in seconds
maxduration	**required**	integer	-	Maximum video ad duration in seconds
protocol	**required**	integer	-	Video bid response protocols. See Table **6.7** Video Bid Response Protocols for a list of possible values.
w	**recommended**	integer	-	Width of the player in pixels. This field is not required, but it's highly recommended that this information be included.
h	**recommended**	integer	-	Height of the player in pixels. This field is not required, but it's highly recommended that this information be included.
startdelay	**recommended**	integer	-	Indicates the start delay in seconds for preroll, midroll, or postroll ad placement. See Table **6.9** Video Start Delay for generic placement values.
linearity	optional	integer	-	Indicates whether the ad impression must be linear, non-linear or can be of any type (field not set). See Table **6.6** Video Linearity for a list of the possible values and recommended bidder interpretation.
sequence	optional	integer	1	If multiple ad impressions are offered in the same bid request, the sequence number will allow for the coordinated delivery of multiple creatives.
battr	optional	array of integers	Assume all types are	Blocked creative attributes. See Table **6.3** Creative Attributes**.** If blank assume all types are

			allowed	allowed.
maxextended	optional	integer	Extension not allowed	Maximum extended video ad duration, if extension is allowed. If blank or 0, extension is not allowed. If -1, extension is allowed, and there is no time limit imposed. If greater than 0, then the value represents the number of seconds of extended play supported beyond the maxduration value.
minbitrate	optional	integer	Any bitrate accepted	Minimum bit rate in Kbps. Exchange may set this dynamically, or universally across their set of publishers.
maxbitrate	optional	integer	Any bitrate accepted	Maximum bit rate in Kbps. Exchange may set this dynamically, or universally across their set of publishers.
boxingallowed	optional	integer	1	If exchange publisher has rules preventing letter boxing of 4x3 content to play in a 16x9 window, then this should be set to false. Default setting is true, which assumes that boxing of content to fit into a window is allowed. “1” indicates boxing is allowed. “0” indicates it is not allowed.
playbackmethod	optional	array of integers	All	List of allowed playback methods. If blank, assume that all are allowed. See Table **6.8** Video Playback Methods for a list of possible values.
delivery	optional	array of integers	All	List of supported delivery methods (streaming, progressive). If blank, assume all are supported. See Table **6.12** Content Delivery Methods for a list of possible values.
pos	optional	integer	Unknown	Ad Position (see table 6.5)
companionad	optional	array of	Not	If companion ads are available, they can be listed as an array of

		objects	available	banner objects. See Banner Object**.**
api	optional	array of integers	Assume None	List of supported API frameworks for this impression. (See Table **6.4** API Frameworks). If an API is not explicitly listed it is assumed not to be supported.
companiontype	optional	array of integers	-	Recommended if companion objects are included. See Table **6.17** VAST Companion Types for a list of possible values.
ext	optional	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.5 Site Object

A site object should be included if the ad supported content is part of a website (as opposed to an application). **A bid request must not contain both a site object and an app object.**

The site object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown. At a minimum, it's useful to provide a page URL or a site ID, but this is not strictly required.

Field	Scope	Type	Description
id	recommended	string	Site ID on the exchange.
name	optional	string	Site name (may be masked at publisher's request).
domain	optional	string	Domain of the site, used for advertiser side blocking. For example, "foo.com".
cat	optional	array of strings	Array of IAB content categories for the overall site. See Table **6.1** Content Categories.
sectioncat	optional	array of strings	Array of IAB content categories for the current subsection of the site. See Table **6.1** Content Categories.
pagecat	optional	array of strings	Array of IAB content categories for the current page. See Table **6.1** Content

			Categories.
page	recommended	string	URL of the page where the impression will be shown.
privacypolicy	optional	integer	Specifies whether the site has a privacy policy. "1" means there is a policy. "0" means there is not.
ref	optional	string	Referrer URL that caused navigation to the current page.
search	optional	string	Search string that caused navigation to the current page.
publisher	optional	object	See Publisher Object
content	optional	object	See Content Object
keywords	optional	string	List of keywords describing this site in a comma separated string. ***ALTERNATE Representation: Array of strings.***
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined

3.3.6 App Object

An "app" object should be included if the ad supported content is part of a mobile application (as opposed to a mobile website). **A bid request must not contain both an "app" object and a "site" object.**

The app object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown. At a minimum, it's useful to provide an App ID or bundle, but this is not strictly required.

Field	Scope	Type	Description
id	recommend ed	string	Application ID on the exchange.
name	optional	string	Application name (may be masked at publisher's request).
domain	optional	string	Domain of the application (e.g., "mygame.foo.com").
cat	optional	array of	Array of IAB content categories for the

		strings	overall application. See Table **6.1** Content Categories.
sectioncat	optional	array of strings	Array of IAB content categories for the current subsection of the app. See Table **6.1** Content Categories**.**
pagecat	optional	array of strings	Array of IAB content categories for the current page/view of the app. See Table **6.1** Content Categories**.**
ver	optional	string	Application version.
bundle	recommended	string	Application bundle or package name (e.g., com.foo.mygame). This is intended to be a unique ID across multiple exchanges.
privacypolicy	optional	integer	Specifies whether the app has a privacy policy. "1" means there is a policy and "0" means there is not.
paid	optional	integer	"1" if the application is a paid version; else "0" (i.e., free).
publisher	optional	object	See Publisher Object
content	optional	object	See Content Object
keywords	optional	string	List of keywords describing this app in a comma separated string. ***ALTERNATE Representation: Array of strings.***
storeurl	optional	string	For QAG 1.5 compliance, an app store URL for an installed app should be passed in the bid request.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in the specification.

3.3.7 Content Object

The content object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown. This object describes the content in which the impression will appear (may be syndicated or non-syndicated content).

This object may be useful in the situation where syndicated content contains impressions and does not necessarily match the publisher's general content. The exchange might or might not have knowledge of the page where the content is running, as a result of the syndication

method. (For example, video impressions embedded in an iframe on an unknown web property or device.)

Field	Scope	Type	Description
id	optional	string	ID uniquely identifying the content
episode	optional	integer	Content episode number (typically applies to video content).
title	optional	string	Content title. **Video examples:** "Search Committee" (television) or "A New Hope" (movie) or "Endgame" (made for web) **Non-video example:** "Why an Antarctic Glacier Is Melting So Quickly" (Time magazine article)
series	optional	string	Content series. **Video examples:** "The Office" (television) or "Star Wars" (movie) or "Arby 'N' The Chief" (made for web) **Non-video example:** "Ecocentric" (Time magazine blog)
season	optional	string	Content season. E.g., "Season 3" (typically applies to video content).
url	optional	string	Original URL of the content, for buy-side contextualization or review
cat	optional	array of strings	Array of IAB content categories for the content. See Table **6.1** Content Categories**.**
videoquality	optional	integer	Video quality per the IAB's classification. See Table **6.14** Video Quality.
keywords	optional	string	Comma separated list of keywords describing the content. ***ALTERNATE Representation: Array of strings.***
contentrating	optional	string	Content rating (e.g., MPAA)
userrating	optional	string	User rating of the content (e.g., number of stars, likes, etc.).
context	optional	string	Specifies the type of content (game, video, text, etc.). See Table **6.13** Content Context**.**
livestream	optional	integer	Is content live? E.g., live video stream, live blog. "1" means content is live. "0" means it is not live.

sourcerelationship	optional	integer	1 for “direct”; 0 for “indirect”
producer	optional	object	See Producer Object
len	optional	integer	Length of content (appropriate for video or audio) in seconds.
qagmediarating	optional	integer	Media rating of the content, per QAG guidelines. See Table 0 QAG Media Ratings for list of possible values
embeddable	optional	integer	From QAG Video Addendum. If content can be embedded (such as an embeddable video player) this value should be set to “1”. If content cannot be embedded, then this should be set to “0”.
language	optional	string	Language of the content. Use alpha-2/ISO 639-1 codes.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.8 Publisher Object

The publisher object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown.

Field	Scope	Type	Description
id	**recommended**	string	Publisher ID on the exchange.
name	optional	string	Publisher name (may be masked at publisher’s request).
cat	optional	array of strings	Array of IAB content categories for the publisher. See Table **6.1** Content Categories**.**
domain	optional	string	Publisher’s highest level domain name, for example “foopub.com”.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.9 Producer Object

The producer is useful when content where the ad is shown is syndicated, and may appear on a completely different publisher. The producer object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown. This object is optional, but useful if the content producer is different from the site publisher.

Field	Scope	Type	Description
id	optional	string	Content producer or originator ID. Useful if content is syndicated, and may be posted on a site using embed tags.
name	optional	string	Content producer or originator name (e.g., "Warner Bros").
cat	optional	array of strings	Array of IAB content categories for the content producer. See Table **6.1** Content Categories.
domain	optional	string	URL of the content producer.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.10 Device Object

The "device" object provides information pertaining to the device including its hardware, platform, location, and carrier. This device can refer to a mobile handset, a desktop computer, set top box or other digital device.

The device object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown.

In general, the most essential fields are either the IP address (to enable geo-lookup for the bidder), or providing geo information directly in the geo object.

Field	Scope	Type	Description
dnt	**recommended**	Integer	If "0", then do not track Is set to false, if "1", then do no track is set to true in browser.
ua	**recommended**	string	Browser user agent string.
ip	**recommended if geo object is not supplied**	string	IPv4 address closest to device.
geo	**recommended if IP is not supplied**	object	Geography as derived from the device's location services (e.g., cell tower triangulation, GPS) or IP address. See Error! Reference source not found..
didsha1	optional	string	SHA1 hashed device ID; IMEI when available, else MEID or ESN. OpenRTB's preferred method for device ID hashing is SHA1.
didmd5	optional	string	MD5 hashed device ID; IMEI when available, else MEID or ESN. Should be interpreted as case insensitive.
dpidsha1	optional	string	SHA1 hashed platform-specific ID (e.g., Android ID or UDID for iOS). OpenRTB's preferred method for device ID hash is SHA1.
dpidmd5	optional	string	MD5 hashed platform-specific ID (e.g., Android ID or UDID for iOS). Should be interpreted as case insensitive.
macsha1	optional	string	SHA1 hashed MAC address of the device.
macmd5	optional	string	MD5 hashed MAC address of the device.
ipv6	optional	string	IP address in IPv6.
carrier	optional	string	Carrier or ISP derived from the IP address. Should be specified using Mobile Network Code (MNC) http://en.wikipedia.org/wiki/Mobile_Network_Code
language	optional	string	Browser language; use alpha-2/ISO 639-1 codes.
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").
js	optional	integer	"1" if the device supports JavaScript; else "0".

connectiontype	optional	integer	Return the detected data connection type for the device. See Table **6.10** Connection Type.
devicetype	optional	integer	Return the device type being used. See Table **6.16** Device Type.
flashver	optional	string	Return the Flash version detected.
ifa	optional	string	Native identifier for advertisers; an opaque ID assigned by the device or browser for use as an advertising identifier.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

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.

3.3.11 Geo Object

The geo object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown.

Note that the Geo Object may appear in one or both the Device Object and the User Object. This is intentional, since the information may be derived from either a device-oriented source (such as IP geo lookup), or by user registration information (for example provided to a publisher through a user registration). If the information is in conflict, it's up to the bidder to determine which information to use.

Field	Scope	Type	Description
lat	optional	float	Latitude from -90 to 90. South is negative. This should only be passed if known to be accurate (For example, not the centroid of

			a postal code).
lon	optional	float	Longitude from -180 to 180. West is negative. This should only be passed if known to be accurate.
country	optional	string	Country using ISO-3166-1 Alpha-3.
region	optional	string	Region using ISO 3166-2.
regionfips104	optional	string	Region of a country using FIPS 10-4 notation (alternative to ISO 3166-2).
metro	optional	string	Pass the metro code (see http://code.google.com/apis/adwords/docs/appendix/metrocodes.html). Metro codes are similar to but not exactly the same as Nielsen DMAs.
city	optional	string	City using United Nations Code for Trade and Transport Locations (http://www.unece.org/cefact/locode/service/location.htm).
zip	optional	string	Zip/postal code.
type	recommended	integer	Indicate the source of the geo data (GPS, IP address, user provided). See Table **6.15** Location Type for a list of potential values. Type should be provided when lat/lon is provided.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.12 User Object

The "user" object contains information known or derived about the human user of the device. Note that the user ID is an exchange artifact (refer to the "device" object for hardware or platform derived IDs) and may be subject to rotation policies. However, this user ID must be stable long enough to serve reasonably as the basis for frequency capping.

The user object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown.

If device ID is used as a proxy for unique user ID, use the device object.

Field	Scope	Type	Description
id	**recommended (or buyeruid)**	string	Unique consumer ID of this user on the exchange.
buyeruid	**recommended (or id)**	string	Buyer's user ID for this user as mapped by exchange for the buyer.
yob	optional	integer	Year of birth as a 4-digit integer.
gender	optional	string	Gender as "M" male, "F" female, "O" Other. (Null indicates unknown).
keywords	optional	string	Comma separated list of keywords of consumer interests or intent. ***ALTERNATE Representation: Array of strings.***
customdata	optional	string	If supported by the exchange, this is custom data that the bidder had stored in the exchange's cookie. The string may be in base85 cookie safe characters, and be in any format. This may useful for storing user features. Note: Proper JSON encoding must be used to include "escaped" quotation marks.
geo	optional	object	Home geo for the user (e.g., based off of registration data); this is different from the current location of the access device (that is defined by the geo object embedded in the Device Object); see Error! Reference source not found.
data	optional	array of objects	See Data Object**.**
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.13 Data Object

The data and segment objects together allow data about the user to be passed to bidders in the bid request. This data may be from multiple sources (e.g., the exchange itself, third party providers) as specified by the data object ID field. A bid request can mix data objects from multiple providers.

The data object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown.

Field	Scope	Type	Description
id	optional	string	Exchange specific ID for the data provider.
name	optional	string	Data provider name.
segment	optional	array of objects	Array of segment objects.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.14 Segment Object

The data and segment objects together allow data about the user to be passed to bidders in the bid request. Segment objects convey specific units of information from the provider identified in the parent data object.

The segment object itself and all of its parameters are optional, so default values are not provided; if an optional parameter is not specified, it should be considered unknown.

Field	Scope	Type	Description
id	optional	string	ID of a data provider's segment applicable to the user
name	optional	string	Name of a data provider's segment applicable to the user
value	optional	string	String representing the value of the segment. The method for transmitting this data should be negotiated offline with the data provider. For example for gender, "male", or "female", for age, "30-40")
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.15 Regulations Object

The "regs" object contains any legal, governmental, or industry regulations that apply to the request.

The first regulation added signal whether or not the request falls under the United States Federal Trade Commission's regulations for the United States Children's Online Privacy Protection Act ("COPPA"). See the COPPA appendix for details.

The regs object itself and all of its parameters are optional, so default values are not provided. If an optional parameter is not specified, it should be considered unknown.

Field	Scope	Type	Description
coppa	optional	integer	Flag indicating whether or not this request falls under the COPPA regulations established by the USA FTC, where 0 = no, 1 = yes.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

3.3.16 PMP Object

The "pmp" object contains a parent object for usage within the context of private marketplaces and the use of the RTB protocol to execute Direct Deals.

Field	Scope	Type	Description
private_auction	optional	integer	An integer flag indicating that this impression is a private auction eligible only to seats named in the Direct Deals object.
deals	optional	object	A collection of "deal" objects encapsulating a list of direct deals eligible for this impression.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

BEST PRACTICE: See Section 7.2 PMP and Direct Deals for implementation guidelines.

3.3.17 Direct Deals Object

A "deal" object constitutes a deal struck *a priori* between a buyer and a seller and indicates that this impression is available under the terms of that deal.

Field	Scope	Type	Default	Description
id	**required**	string		A unique identifier for the direct deal.
bidfloor	optional	float	0	Bid floor for this impression (in CPM of bidfloorcur).
bidfloorcur	optional	string	USD	If bid floor is specified and multiple currencies supported per bid request, then currency should be specified here using ISO-4217 alphabetic codes. Note, this may be different from bid currency returned by bidder, if this is allowed on an exchange.
wseat	optional	array of strings	-	Array of buyer seats allowed to bid on this Direct Deal. Seats are an optional feature of exchange. For example, ["4","34","82","A45"] indicates that only advertisers using these exchange seats are allowed to bid on the impressions in this auction.
at	Optional	Integer		Auction type. If "1", then first price auction. If "2", then second price auction. If "3", the passed bidfloor indicates the apriori agreed upon deal price. Additional auction types can be defined as per the exchange's business rules.
ext	optional	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

BEST PRACTICE: See Section 7.2 PMP and Direct Deals for implementation guidelines.

4 Bid Response Details

4.1 Object List

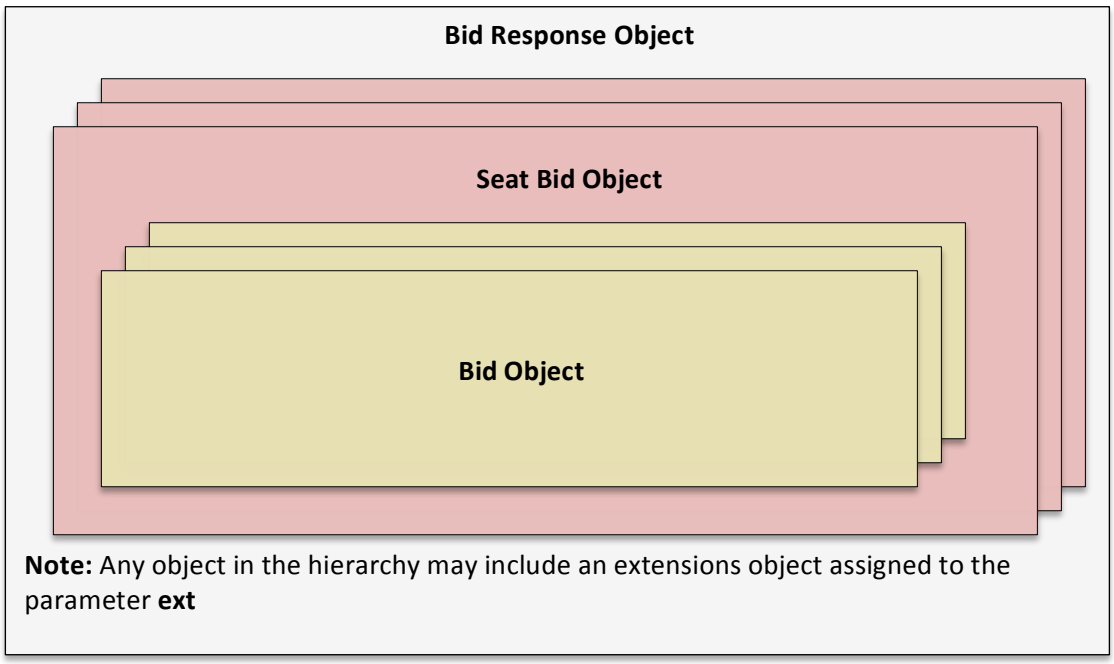
Following is the object list for the bid response:

Object Name	Scope	Notes
Bid Response	**required**	Top-level object

seatbid	**required**	At least one seatbid object is required in a bid response object.
bid	**required**	At least one bid object is required in a bid set object.
ext	optional	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification. Any object may contain extensions. In order to keep extension fields consistent across platforms, they should consistently be named 'ext'.

4.2 Object Hierarchy

Following is the object hierarchy for a bid response:



Note: Any object in the hierarchy may include an extensions object assigned to the parameter **ext**

4.3 Object Definitions

Following are definitions for the bid response objects.

4.3.1 Bid Response Object

The top-level bid response object is defined below. The "id" attribute is a reflection of the bid request ID for logging purposes. Similarly, "bidid" is an optional response tracking ID for bidders. If specified, it can be included in the subsequent win notice call if the bidder wins. At least one "seatbid" object is required, which contains a bid on at least one impression. Other attributes are optional since an exchange may establish default values.

No-Bids on all impressions should be indicated as a HTTP 204 response. For no-bids on specific impressions, the bidder should omit these from the bid response.

Field	Scope	Type	Description
Id	**required**	string	ID of the bid request.
seatbid	**required**	array of objects	Array of seatbid objects.
bidid	optional	string	Bid response ID to assist tracking for bidders. This value is chosen by the bidder for cross-reference.
cur	optional	string	Bid currency using ISO-4217 alphabetic codes; default is "USD".
customdata	optional	string	This is an optional feature, which allows a bidder to set data in the exchange's cookie. The string may be in base85 cookie safe characters, and be in any format. This may be useful for storing user features. Note: Proper JSON encoding must be used to include "escaped" quotation marks.
nbr	optional	Integer	Reason for not bidding. See Table 6.19 No-Bid Reason Codes.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

4.3.2 Seat Bid Object

A bid response can contain multiple "seatbid" objects, each on behalf of a different bidder seat. Since a bid request can include multiple impressions, each "seatbid" object can contain multiple bids each pertaining to a different impression on behalf of a seat. Thus, each "bid" object must include the impression ID to which it pertains as well as the bid price. The "group" attribute can be used to specify if a seat is willing to accept any impressions that it can win (default) or if it is only interested in winning any if it can win them all (i.e., all or nothing).

Field	Scope	Type	Description
bid	**required**	array of objects	Array of bid objects; each bid object relates to an imp object in the bid request. Note that, if supported by an exchange, one imp object can have many bid objects.
seat	optional	string	ID of the bidder seat on whose behalf this bid is made.
group	optional	integer	"1" means impressions must be won-lost as a group; default is "0".
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

4.3.3 Bid Object

For each bid, the "nurl" attribute contains the win notice URL. If the bidder wins the impression, the exchange calls this notice URL a) to inform the bidder of the win and b) to convey certain information using substitution macros (see Section **4.6** Substitution Macros).

The "adomain" attribute can be used to check advertiser block list compliance. The "iurl" attribute can provide a link to an image that is representative of the campaign's content (irrespective of whether the campaign may have multiple creatives). This enables human review for spotting inappropriate content. The "cid" attribute can be used to block ads that were previously identified as inappropriate; essentially a safety net beyond the block lists. The "crid" attribute can be helpful in reporting creative issues back to bidders. Finally, the "attr" array indicates the creative attributes that describe the ad to be served.

> ***BEST PRACTICE:*** Substitution macros may allow a bidder to use a static notice URL for all of its bids. Thus, exchanges should offer the option of a default notice URL that can be pre-configured per bidder to reduce redundant data transfer.

Field	Scope	Type	Description
Id	**required**	string	ID for the bid object chosen by the bidder for tracking and debugging purposes. Useful when multiple bids are submitted for a single impression for a given seat.
impid	**required**	string	ID of the impression object to which this bid applies.
price	**required**	float	Bid price in CPM. WARNING/Best Practice Note: Although this value is a float, OpenRTB strongly suggests using integer math for accounting to avoid rounding errors.
adid	optional	string	ID that references the ad to be served if the bid wins.
nurl	optional	string	Win notice URL. Note that ad markup is also typically, but not necessarily, returned via this URL.
adm	optional	string	Actual ad markup. XHTML if a response to a banner object, or VAST XML if a response to a video object.
adomain	optional	array of strings	Advertiser's primary or top-level domain for advertiser checking. This can be a list of domains if there is a rotating creative. However, exchanges may mandate that only one landing domain is allowed.
Iurl	optional	string	Sample image URL (without cache busting) for content checking
cid	optional	string	Campaign ID or similar that appears within the ad markup
crid	optional	string	Creative ID for reporting content issues or defects. This could also be used as a reference to a creative ID that is posted with an exchange.
attr	optional	array of integers	Array of creative attributes. See Table **6.3** Creative Attributes**.**
dealid	optional	string	A unique identifier for the direct deal associated with the bid. If the bid is associated and in response to a dealid

			in the request object it is ***required***.
ext	optional	object	This object is a placeholder that may contain custom JSON agreed to by the parties in an OpenRTB transaction to support flexibility beyond the standard defined in this specification.

4.4 Loss Notification

Exchanges are encouraged to supply lost bid data via an offline or separate process outside of the bid request / response protocol.

4.5 Ad Serving Options

There are two methods by which the winning bidder can return ad markup to the exchange. In either case, the ad markup is either XHTML if the bidder is responding with a banner or VAST XML if responding with a VAST video.

4.5.1 Ad Served on the Win Notice

In this method, ad markup is returned to the exchange is via the win notice. In this case, the response body of the win notice call (e.g., invoking the "nurl" attribute) contains the ad markup and only the ad markup; there must be no other structured data in the response body. Using this method, the "adm" attribute in the "bid" object must be omitted.

4.5.2 Ad Served in the Bid

In this method, ad markup is returned directly in the bid itself. This is accomplished via the "adm" attribute in the "bid" object. If both the "adm" attribute and win notice return data, the "adm" contents will take precedence.

4.5.3 Comparison of Ad Serving Approaches

Each of the ad serving methods has its own advantages that may be of varying importance to either the exchange or the bidder.

- **Ad Served in the Bid**
  - Potential Concurrency: *The exchange can choose to return that ad markup and call the win notice concurrently, thereby improving user experience.*
  - Reduced Risk of Forfeiture: *A forfeit is the scenario in which a bidder wins, but forfeits due to technical failure serving the ad. This can occur when serving on the win notice (e.g., win notice call failure), but is mitigated by including the ad in the bid.*

- **Ad Served on the Win Notice**

- Reduced Bandwidth Costs: *Serving ad markup only upon winning can save large amounts of bandwidth usage, the costs for which can mount up over high volumes.*
- Additional Bidder Flexibility: *Bidders may typically know the ad they will serve at the time of bid, but this provides an additional optional decision point after the settlement price has been established.*

4.6 Substitution Macros

The win notice URL and its format are defined by the bidder. In order for the exchange to convey certain information to the winning bidder (e.g., the settlement price), a number of substitution macros can be inserted into the win notice URL definition. Prior to calling a win notice URL, the exchange will search the specified URL for any of the defined macros and replace them with the appropriate data. Note that the substitution is simple in the sense that wherever a legal macro is found, it will be replaced without regard for syntax correctness. Furthermore, if the source value is an optional parameter that was not specified, the macro will simply be removed (i.e., replaced with a zero-length string).

These same substitution macros can also be placed in the ad markup. The exchange will perform the same data substitutions as in the win notice URL. This occurs irrespective of whether the markup is returned on the win notice or passed in the "adm" attribute of the bid response. A use case for macros in the ad markup might be when a bidder prefers to receive its win notice from the device itself. To accomplish this, the bidder would include a tracking pixel in the ad markup the URL for which would include any of the available macros.

Macro	Description
${AUCTION_ID}	ID of the bid request; from "id" attribute.
${AUCTION_BID_ID}	ID of the bid; from "bidid" attribute.
${AUCTION_IMP_ID}	ID of the impression just won; from "impid" attribute.
${AUCTION_SEAT_ID}	ID of the bidder's seat for whom the bid was made.
${AUCTION_AD_ID}	ID of the ad markup the bidder wishes to serve; from "adid" attribute.
${AUCTION_PRICE}	Settlement price using the same currency and units as the bid.
${AUCTION_CURRENCY}	The currency used in the bid (explicit or implied); for confirmation only.

Prior to substitution, macro data values can be encoded for security purposes using various obfuscation or encryption algorithms. This may be of particular interest for use cases such as the foregoing where price information is carried beyond the exchange, through the publisher, and into the device browser via a tracking pixel in the markup.

To specify that a particular macro is to be encoded, the suffix ":X" should be appended to the macro name, where X is a string that indicates the algorithm to be used. Algorithms choices are not defined by this specification, but must be mutually agreed upon between exchange and

bidder. As an example, suppose that the price macro is to be encoded using Base64 and that its code is "B64". The macro would then be written as follows:

```
${AUCTION_PRICE:B64}
```

BEST PRACTICE: Encoding of macro data should be used sparingly due to the additional processing overhead. For communications strictly between exchange and bidder (e.g., a win notice called from the exchange), encoding is generally unnecessary.

5 Bid Request/Response Samples

5.1 GitHub Repository

The official OpenRTB GitHub repository now contains a set of validated example requests. This repo should be considered the canonical examples for implementers.

https://github.com/openrtb/examples

5.2 Bid Requests

5.2.1 Example 1 – Simple Banner

Following is a basic example of a bid request for a banner ad. Some optional parameters are included in this example.

```
{
  "id": "80ce30c53c16e6ede735f123ef6e32361bfc7b22",
  "imp": [
    {
      "id": "1",
      "banner": {
        "h": 250,
        "w": 300,
        "pos": 0
      },
      "bidfloor": 0.03
    }
  ],
  "site": {
    "id": "102855",
    "domain": "http://www.foobar.com",
```

```
      "cat": "IAB3-1",
      "page": "http://www.foobar.com/1234.html ",
      "publisher": {
        "id": "8953",
        "name": "foobar.com",
        "cat": "IAB3-1",
        "domain": "foobar.com"
      }
   },
   "device": {
      "ua": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_6_8) AppleWebKit/537.13  (KHTML, like Gecko) Version/5.1.7 Safari/534.57.2",
      "ip": "123.145.167.*"
   },
   "user": {
      "id": "55816b39711f9b5acf3b90e313ed29e51665623f"
   },
   "at": 1,
   "cur": [
      "USD"
   ],
}
```

5.2.2 Example 2 – Expandable Creative

This example builds the first and adds parameters to describe support for an expandable creative, and passes data about the user from “Data Provider 1”.

```
{
   "id": "123456789316e6ede735f123ef6e32361bfc7b22",
   "imp": [
```

```
    {
      "id": "1",
      "banner": {
        "h": 250,
        "w": 300,
        "pos": 0,
        "battr":[
            13
         ],
        "expandable":[
            2,
           4
         ],
        "iframebuster":[
           "vendor1.com",
           "vendor2.com"
         ]
      },
      "bidfloor": 0.03
    }
  ],
  "site": {
    "id": "102855",
    "domain": "http://www.foobar.com",
    "cat": "IAB3-1",
    "page": "http://www.foobar.com/1234.html ",
    "publisher": {
      "id": "8953",
      "name": "foobar.com",
      "cat": "IAB3-1",
      "domain": "foobar.com"
    }
```

```
  },
  "device": {
    "ua": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_6_8) AppleWebKit/537.13  (KHTML, like
Gecko) Version/5.1.7 Safari/534.57.2",
    "ip": "123.145.167.*"
  },
  "user": {
    "id": "55816b39711f9b5acf3b90e313ed29e51665623f"
    "buyeruid":"5456787654678765678987656789876543",
    "data":[
     {
       "id":"6",
       "name":"Data Provider 1",
       "segment":[
         {
           "id":"12341318394918",
           "name":"auto intenders"
         },
         {
           "id":"1234131839491234",
           "name":"auto enthusiasts"
         },
         {
           "id":"23423424",
           "name":"data-provider1-age",
           "value":"30-40"
         }
       ]
     }
  },
  "at": 1,
  "cur": [
```

```
      "USD"
   ],
}
```

5.2.3 Example 3 – Mobile

Example 3 uses a device object to reflect a mobile device, and an app object to reflect a request from a mobile application.

```
{
   "id": "IxexyLDIIk",
   "imp": [
      {
         "id": "1",
         "banner": {
            "w": 728,
            "h": 90,
            "pos": 1,
            "btype": [
               4
            ],
            "battr": [
               14
            ],
            "api": [
               3
            ]
         },
         "instl": 0,
         "tagid": "agltb3B1Yi1pbmNyDQsSBFNpdGUY7fD0FAw",
         "bidfloor": 0.5
```

```
      }
   ],
   "app": {
      "id": "agltb3B1Yi1pbmNyDAsSA0FwcBiJkfIUDA",
      "name": "Yahoo Weather",
      "cat": [
         "weather",
         "IAB15",
         "IAB15-10"
      ],
      "ver": "1.0.2",
      "bundle": "628677149",
      "publisher": {
         "id": "agltb3B1Yi1pbmNyDAsSA0FwcBiJkfTUCV",
         "name": "yahoo",
         "domain": "www.yahoo.com"
      },
      "storeurl": "https://itunes.apple.com/id628677149"
   },
   "device": {
      "dnt": 0,
      "ua": "Mozilla/5.0 (iPhone; CPU iPhone OS 6_1 like Mac OS X) AppleWebKit/534.46 (KHTML,
like Gecko) Version/5.1 Mobile/9A334 Safari/7534.48.3",
      "ip": "123.145.167.189",
      "geo": {
         "country": "USA",
         "lat": 35.012345,
         "lon": -115.12345,
         "city": "Los Angeles",
         "metro": "803",
         "region": "CA",
         "zip": "90049"
```

```
      },
      "dpidsha1": "AA000DFE74168477C70D291f574D344790E0BB11",
      "dpidmd5": "AA003EABFB29E6F759F3BDAB34E50BB11",
      "carrier": "310-410",
      "language": "en",
      "make": "Apple",
      "model": "iPhone",
      "os": "iOS",
      "osv": "6.1",
      "js": 1,
      "connectiontype": 3,
      "devicetype": 1
   },
   "user": {
      "id": "ffffffd5135596709273b3a1a07e466ea2bf4fff",
      "yob": "1984",
      "gender": "M"
   },
   "at": 2,
   "bcat": [
      "IAB25",
      "IAB7-39",
      "IAB8-18",
      "IAB8-5",
      "IAB9-9"
   ],
   "badv": [
      "apple.com",
      "go-text.me",
      "heywire.com"
   ]
}
```

5.2.4 Example 4 – Video

The following example illustrates a bid request for a video impression with two companion ad slots (1 expandable). Additionally, the video content itself is described in the "content" object. A few notes about specific fields in the example:

- protocol: Only VAST 2.0 and 3.0 are allowed. Note that a wrapper response is not allowed in this example.
- sequence: it is not explicitly included so the default of '1' should be assumed.
- battr: User interactive and alert stype ads (value '13' and '14', respectively) are explicitly being blocked for both the video and its companions.
- pos: Indicates this opportunity is "above the fold".
- api: Indicates that VPAID 1.0 containers are explicitly supported. As such, the mime types supported for VPAID are only "application/x-shockwave-flash" and "application/javascript". Note that there is an implicit resitrction as to which protocol is allowed in which mimetype. JavaScript support was not specificed until VPAID 2.0, while Flash supports both VPAID 1.0 and 2.0.
- companiontype: Indicates only static or HTML resources are allowed.
- ext: an exchange-specific deals extension is passed to inform the bidder of the priority assigned deals.

```
{
  "id": "1234567893",
  "at": 2,
  "tmax": 120,
  "imp": [
    {
      "id": "1",
      "bidfloor": 0.03,
      "video":
      {
        "mimes": [
          "video/x-flv",
          "video/mp4",
          "application/x-shockwave-flash",
```

```
        "application/javascript"
      ],
      "linearity": 1,
      "minduration": 5,
      "maxduration": 30,
      "protocol": [2,3],
      "w": 640,
      "h": 480,
      "startdelay": 0,
      "battr": [13,14],
      "maxextended": 30,
      "minbitrate": 300,
      "maxbitrate": 1500,
      "boxingallowed": true,
      "playbackmethod": [1,3],
      "delivery": [2],
      "pos": 1,
      "companionad": [
        {
          "id": "1234567893-1",
          "w": 300,
          "h": 250,
          "pos": 1,
          "battr": [13,14],
          "expandable": [2,4]
        },
        {
          "id": "1234567893-2",
          "w": 728,
          "h": 90,
          "pos": 1,
          "battr": [13,14]
```

```
            }
          ],
          "companiontype": [1,2],
          "api": [1,2]
       }
    }
  ],
  "site":
  {
    "id": "1345135123",
    "name": "Site ABCD",
    "domain": "siteabcd.com",
    "sitecat": [
      "IAB2-1",
      "IAB2-2"
    ],
    "page": "http://siteabcd.com/page.htm",
    "ref": "http://referringsite.com/referringpage.htm",
    "privacypolicy": true,
    "publisher":
    {
      "id": "pub12345",
      "name": "Publisher A"
    },
    "content":
    {
      "id": "1234567",
      "episode": 23,
      "title":  "Car Show",
      "series": "All About Cars",
      "season": 2,
      "cat": ["IAB2-2"],
```

```
        "keyword": ["keyword a", "keyword b", "keyword c"]
      }
   },
   "device":
   {
      "ip": "64.124.253.1",
      "ua": "Mozilla/5.0 (Macintosh; U; Intel Mac OS X 10.6; en-US; rv:1.9.2.16) Gecko/20110319
Firefox/3.6.16",
      "os": "OS X",
      "flashversion": "10.1",
      "js": 1
   },
   "user":
   {
      "uid": "456789876567897654678987656789",
      "buyeruid": "5456787654678765678987656789876 54",
      "data": [
        {
          "id": "6",
          "name": "Data Provider 1",
          "segment": [
            {
              "id": "12341318394918",
              "name": "auto intenders"
            },
            {
              "id": "1234131839491234",
              "name": "auto enthusiasts"
            }
          ]
        }
      ]
```

```
  }
}
```

5.2.5 Example 5 – PMP w/ Direct Deal

Following is a basic example of a bid request for a banner ad with a direct deal. Some optional parameters are included in this example.

```
{
  "id": "80ce30c53c16e6ede735f123ef6e32361bfc7b22",
  "imp": [
    {
      "id": "1",
      "banner": {
        "h": 250,
        "w": 300,
        "pos": 0
      },
      "bidfloor": 0.03,
      "pmp":{
        "private_auction":1,
        "deals":[
        {
          "id":"AB-Agency1-0001",
          "bidfloor":2.5,
          "wseat":[
            "Agency1"
          ],
          "at":1,
          "ext":{

          }
        },
        {
          "id":"XY-Agency2-0001",
          "bidfloor":2,
          "wseat":[
            "Agency2"
```

```
            ],
            "at":2
          }
        ]
      }
    }
  ],
  "site": {
    "id": "102855",
    "domain": "http://www.foobar.com",
    "cat": "IAB3-1",
    "page": "http://www.foobar.com/1234.html ",
    "publisher": {
      "id": "8953",
      "name": "foobar.com",
      "cat": "IAB3-1",
      "domain": "foobar.com"
    }
  },
  "device": {
    "ua": "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_6_8) AppleWebKit/537.13  (KHTML, like
Gecko) Version/5.1.7 Safari/534.57.2",
    "ip": "123.145.167.*"
  },
  "user": {
    "id": "55816b39711f9b5acf3b90e313ed29e51665623f"
  },
  "at": 1,
  "cur": [
    "USD"
  ],
}
```

5.3 Bid Responses

5.3.1 Example 1 – Ad Served on Win Notice

Following is an example of a bid response with the ad served on win notice. The bid for this impression is a $9.43 CPM.


```
{
  "id":"1234567890",
  "seatbid":[
    {
      "bid":[
        {
          "id":"1",
          "impid":"102",
          "price":9.43,
          "adid":"314",
          "nurl":"http://adserver.com/winnotice?impid=102",
          "adm":"%3C!DOCTYPE%20html%20PUBLIC%20%5C%22-
%2F%2FW3C%2F%2FDTD%20XHTML%201.0%20Transitional%2F%2FEN%5C%22%20%5C%22htt
p%3A%2F%2Fwww.w3.org%2FTR%2Fxhtml1%2FDTD%2Fxhtml1-
transitional.dtd%5C%22%3E%3Chtml%20xmlns%3D%5C%22http%3A%2F%2Fwww.w3.org%2F1
999%2Fxhtml%5C%22%20xml%3Alang%3D%5C%22en%5C%22%20lang%3D%5C%22en%5C%22
%3E...%3C%2Fhtml%3E",
          "adomain":[
            "advertiserdomain.com"
          ],
          "iurl":"http://adserver.com/pathtosampleimage",
          "cid":"campaign111",
          "crid":"creative112",
          "attr":[
```

```
            1,
            2,
            3,
            4,
            5,
            6,
            7,
            12
          ]
        }
      ],
      "seat":"512"
    }
  ],
  "bidid":"abc1123",
  "cur":"USD"
}
```

5.3.2 Example 2 – VAST URL Returned

Following is an example of a bid response that returns a VAST URL to be served. The bid for this impression is a $9.43 CPM.

```
{
  "id":"1234567890",
  "seatbid":[
    {
      "bid":[
```

```
        {
          "id":"kljaf9",
          "impid":"1",
          "price":9.43,
          "nurl":"http://adserver.com/WinNoticeUrlThatReturnsVAST"
        }
      ]
    }
  ]
}
```

5.3.3 Example 3 – VAST XML Document Returned Inline

Following is an example of a bid response that returns the VAST document inline to be served. A few notes about specific fields in the example:

- The bid for this impression is a $3.00 CPM.
- Note that since there both a win notice URL and an inline VAST document, the adm attribute is used for the VAST ad markeup.

```
{
  "id": "123",
  "seatbid": [
    {
      "bid": [
        {
          "id": 12345,
          "impid": 2,
          "price": 3.00,
          "nurl": "http://example.com/winnoticeurl",
          "adm": "%3C%3Fxml%20version%3D%221.0%22%20encoding%3D%22utf-
8%22%3F%3E%0A%3CVAST%20version%3D%222.0%22%3E%0A%20%20%20%20%3CAd%20id%
3D%2212345%22%3E%0A%20%20%20%20%20%20%20%20%3CInLine%3E%0A%20%20%20%20
%20%20%20%20%20%20%20%20%3CAdSystem%20version%3D%221.0%22%3ESpotXchange%3
```

C%2FAdSystem%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3C
AdTitle%3E%3C!%5BCDATA%5BSample%20VAST%5D%5D%3E%3C%2FAdTitle%3E%0A%20%20%
20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3CImpression%3Ehttp%3A%2F%2Fsa
mple.com%3C%2FImpression%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%3CDescription%3E%3C!%5BCDATA%5BA%20sample%20VAST%20feed%5D%5D%3E%
3C%2FDescription%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%
3CCreatives%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%3CCreative%20sequence%3D%221%22%20id%3D%221%22%3E%0A%20%20%20%20
%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3CLinear
%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%
20%20%20%20%20%20%20%20%3CDuration%3E00%3A00%3A30%3C%2FDuration%3E%0A%20
%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%20%20%3CTrackingEvents%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3C%2FTrackingEvents%3
E%20%20%20%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20
%20%20%20%20%20%20%20%20%20%20%20%3CVideoClicks%3E%0A%20%20%20%20%20%20%20
%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%3CClickThrough%3E%3C!%5BCDATA%5Bhttp%3A%2F%2Fsample.com%2Fopenrtbtes
t%5D%5D%3E%3C%2FClickThrough%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20
%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3C%2FVideoClicks%3E%0A
%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%20%20%20%3CMediaFiles%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%2
0%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3CMedi
aFile%20delivery%3D%22progressive%22%20bitrate%3D%22256%22%20width%3D%22640%22
%20height%3D%22480%22%20type%3D%22video%2Fmp4%22%3E%3C!%5BCDATA%5Bhttp%3
A%2F%2Fsample.com%2Fvideo.mp4%5D%5D%3E%3C%2FMediaFile%3E%0A%20%20%20%20%
20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20
%20%3C%2FMediaFiles%3E%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20
%20%20%20%20%20%20%20%20%20%20%20%3C%2FLinear%3E%0A%20%20%20%20%20%20%20%20%20
%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3C%2FCreative%3E%0A%20%20%20%20%2
0%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%3C%2FCreatives%3E%0A%20%20%20%20%20
%20%20%20%3C%2FInLine%3E%0A%20%20%20%20%3C%2FAd%3E%0A%3C%2FVAST%3E",

```
            "ext": null
            }
        ]
    }
  ]
}
```

5.3.4 Example 4 – Direct Deal Ad Served on Win Notice

Following is an example of a bid response with the ad served on win notice. The bid for this impression is a $5.00 CPM against a direct deal.

```
{
  "id":"1234567890",
  "seatbid":[
    {
      "bid":[
        {
          "id":"1",
          "impid":"102",
          "price":5.00,
          "dealid":"ABC-1234-6789",
          "adid":"314",
          "nurl":"http: //adserver.com/winnotice?impid=102",
          "adm":"%3C!DOCTYPE%20html%20PUBLIC%20%5C%22-
%2F%2FW3C%2F%2FDTD%20XHTML%201.0%20Transitional%2F%2FEN%5C%22%20%5C%22htt
p%3A%2F%2Fwww.w3.org%2FTR%2Fxhtml1%2FDTD%2Fxhtml1-
transitional.dtd%5C%22%3E%3Chtml%20xmlns%3D%5C%22http%3A%2F%2Fwww.w3.org%2F1
999%2Fxhtml%5C%22%20xml%3Alang%3D%5C%22en%5C%22%20lang%3D%5C%22en%5C%22
%3E...%3C%2Fhtml%3E",
          "adomain":[
            "advertiserdomain.com"
          ],
          "iurl":"http: //adserver.com/pathtosampleimage",
          "cid":"campaign111",
          "crid":"creative112",
          "attr":[
            1,
            2,
            3,
            4
          ]
        }
      ],
      "seat":"512"
    }
  ],
  "bidid":"abc1123",
  "cur":"USD"
}
```

6 Reference Lists/Enumerations

BEST PRACTICE: All reference lists are actively maintained by the IAB on the OpenRTB web site. As such, implementers should ensure they are working from the latest lists and enumerations

6.1 Content Categories

The following list represents the IAB's contextual taxonomy for categorization. Standard IDs have been adopted to easily support the communication of primary and secondary categories for various objects. *Note to the reader: This OpenRTB table has values derived from the IAB Quality Assurance Guidelines (QAG). Users of OpenRTB should keep in synch with updates to the QAG values as published on IAB.net.*

Value	Description
IAB1	**Arts & Entertainment**
IAB1-1	Books & Literature
IAB1-2	Celebrity Fan/Gossip
IAB1-3	Fine Art
IAB1-4	Humor
IAB1-5	Movies
IAB1-6	Music
IAB1-7	Television
IAB2	**Automotive**
IAB2-1	Auto Parts
IAB2-2	Auto Repair
IAB2-3	Buying/Selling Cars
IAB2-4	Car Culture
IAB2-5	Certified Pre-Owned
IAB2-6	Convertible
IAB2-7	Coupe
IAB2-8	Crossover
IAB2-9	Diesel

IAB2-10	Electric Vehicle
IAB2-11	Hatchback
IAB2-12	Hybrid
IAB2-13	Luxury
IAB2-14	MiniVan
IAB2-15	Mororcycles
IAB2-16	Off-Road Vehicles
IAB2-17	Performance Vehicles
IAB2-18	Pickup
IAB2-19	Road-Side Assistance
IAB2-20	Sedan
IAB2-21	Trucks & Accessories
IAB2-22	Vintage Cars
IAB2-23	Wagon
IAB3	**Business**
IAB3-1	Advertising
IAB3-2	Agriculture
IAB3-3	Biotech/Biomedical
IAB3-4	Business Software
IAB3-5	Construction
IAB3-6	Forestry
IAB3-7	Government
IAB3-8	Green Solutions
IAB3-9	Human Resources
IAB3-10	Logistics
IAB3-11	Marketing
IAB3-12	Metals
IAB4	**Careers**
IAB4-1	Career Planning
IAB4-2	College
IAB4-3	Financial Aid
IAB4-4	Job Fairs

IAB4-5	Job Search
IAB4-6	Resume Writing/Advice
IAB4-7	Nursing
IAB4-8	Scholarships
IAB4-9	Telecommuting
IAB4-10	U.S. Military
IAB4-11	Career Advice
IAB5	**Education**
IAB5-1	7-12 Education
IAB5-2	Adult Education
IAB5-3	Art History
IAB5-4	Colledge Administration
IAB5-5	College Life
IAB5-6	Distance Learning
IAB5-7	English as a 2nd Language
IAB5-8	Language Learning
IAB5-9	Graduate School
IAB5-10	Homeschooling
IAB5-11	Homework/Study Tips
IAB5-12	K-6 Educators
IAB5-13	Private School
IAB5-14	Special Education
IAB5-15	Studying Business
IAB6	**Family & Parenting**
IAB6-1	Adoption
IAB6-2	Babies & Toddlers
IAB6-3	Daycare/Pre School
IAB6-4	Family Internet
IAB6-5	Parenting - K-6 Kids
IAB6-6	Parenting teens
IAB6-7	Pregnancy
IAB6-8	Special Needs Kids

IAB6-9	Eldercare
IAB7	**Health & Fitness**
IAB7-1	Exercise
IAB7-2	A.D.D.
IAB7-3	AIDS/HIV
IAB7-4	Allergies
IAB7-5	Alternative Medicine
IAB7-6	Arthritis
IAB7-7	Asthma
IAB7-8	Autism/PDD
IAB7-9	Bipolar Disorder
IAB7-10	Brain Tumor
IAB7-11	Cancer
IAB7-12	Cholesterol
IAB7-13	Chronic Fatigue Syndrome
IAB7-14	Chronic Pain
IAB7-15	Cold & Flu
IAB7-16	Deafness
IAB7-17	Dental Care
IAB7-18	Depression
IAB7-19	Dermatology
IAB7-20	Diabetes
IAB7-21	Epilepsy
IAB7-22	GERD/Acid Reflux
IAB7-23	Headaches/Migraines
IAB7-24	Heart Disease
IAB7-25	Herbs for Health
IAB7-26	Holistic Healing
IAB7-27	IBS/Crohn's Disease
IAB7-28	Incest/Abuse Support
IAB7-29	Incontinence
IAB7-30	Infertility

IAB7-31	Men's Health
IAB7-32	Nutrition
IAB7-33	Orthopedics
IAB7-34	Panic/Anxiety Disorders
IAB7-35	Pediatrics
IAB7-36	Physical Therapy
IAB7-37	Psychology/Psychiatry
IAB7-38	Senor Health
IAB7-39	Sexuality
IAB7-40	Sleep Disorders
IAB7-41	Smoking Cessation
IAB7-42	Substance Abuse
IAB7-43	Thyroid Disease
IAB7-44	Weight Loss
IAB7-45	Women's Health
IAB8	**Food & Drink**
IAB8-1	American Cuisine
IAB8-2	Barbecues & Grilling
IAB8-3	Cajun/Creole
IAB8-4	Chinese Cuisine
IAB8-5	Cocktails/Beer
IAB8-6	Coffee/Tea
IAB8-7	Cuisine-Specific
IAB8-8	Desserts & Baking
IAB8-9	Dining Out
IAB8-10	Food Allergies
IAB8-11	French Cuisine
IAB8-12	Health/Lowfat Cooking
IAB8-13	Italian Cuisine
IAB8-14	Japanese Cuisine
IAB8-15	Mexican Cuisine
IAB8-16	Vegan

IAB8-17	Vegetarian
IAB8-18	Wine
IAB9	**Hobbies & Interests**
IAB9-1	Art/Technology
IAB9-2	Arts & Crafts
IAB9-3	Beadwork
IAB9-4	Birdwatching
IAB9-5	Board Games/Puzzles
IAB9-6	Candle & Soap Making
IAB9-7	Card Games
IAB9-8	Chess
IAB9-9	Cigars
IAB9-10	Collecting
IAB9-11	Comic Books
IAB9-12	Drawing/Sketching
IAB9-13	Freelance Writing
IAB9-14	Genealogy
IAB9-15	Getting Published
IAB9-16	Guitar
IAB9-17	Home Recording
IAB9-18	Investors & Patents
IAB9-19	Jewelry Making
IAB9-20	Magic & Illusion
IAB9-21	Needlework
IAB9-22	Painting
IAB9-23	Photography
IAB9-24	Radio
IAB9-25	Roleplaying Games
IAB9-26	Sci-Fi & Fantasy
IAB9-27	Scrapbooking
IAB9-28	Screenwriting
IAB9-29	Stamps & Coins

IAB9-30	Video & Computer Games
IAB9-31	Woodworking
IAB10	**Home & Garden**
IAB10-1	Appliances
IAB10-2	Entertaining
IAB10-3	Environmental Safety
IAB10-4	Gardening
IAB10-5	Home Repair
IAB10-6	Home Theater
IAB10-7	Interior Decorating
IAB10-8	Landscaping
IAB10-9	Remodeling & Construction
IAB11	**Law, Gov't & Politics**
IAB11-1	Immigration
IAB11-2	Legal Issues
IAB11-3	U.S. Government Resources
IAB11-4	Politics
IAB11-5	Commentary
IAB12	**News**
IAB12-1	International News
IAB12-2	National News
IAB12-3	Local News
IAB13	**Personal Finance**
IAB13-1	Beginning Investing
IAB13-2	Credit/Debt & Loans
IAB13-3	Financial News
IAB13-4	Financial Planning
IAB13-5	Hedge Fund
IAB13-6	Insurance
IAB13-7	Investing
IAB13-8	Mutual Funds
IAB13-9	Options

IAB13-10	Retirement Planning
IAB13-11	Stocks
IAB13-12	Tax Planning
IAB14	**Society**
IAB14-1	Dating
IAB14-2	Divorce Support
IAB14-3	Gay Life
IAB14-4	Marriage
IAB14-5	Senior Living
IAB14-6	Teens
IAB14-7	Weddings
IAB14-8	Ethnic Specific
IAB15	**Science**
IAB15-1	Astrology
IAB15-2	Biology
IAB15-3	Chemistry
IAB15-4	Geology
IAB15-5	Paranormal Phenomena
IAB15-6	Physics
IAB15-7	Space/Astronomy
IAB15-8	Geography
IAB15-9	Botany
IAB15-10	Weather
IAB16	**Pets**
IAB16-1	Aquariums
IAB16-2	Birds
IAB16-3	Cats
IAB16-4	Dogs
IAB16-5	Large Animals
IAB16-6	Reptiles
IAB16-7	Veterinary Medicine
IAB17	**Sports**

IAB17-1	Auto Racing
IAB17-2	Baseball
IAB17-3	Bicycling
IAB17-4	Bodybuilding
IAB17-5	Boxing
IAB17-6	Canoeing/Kayaking
IAB17-7	Cheerleading
IAB17-8	Climbing
IAB17-9	Cricket
IAB17-10	Figure Skating
IAB17-11	Fly Fishing
IAB17-12	Football
IAB17-13	Freshwater Fishing
IAB17-14	Game & Fish
IAB17-15	Golf
IAB17-16	Horse Racing
IAB17-17	Horses
IAB17-18	Hunting/Shooting
IAB17-19	Inline Skating
IAB17-20	Martial Arts
IAB17-21	Mountain Biking
IAB17-22	NASCAR Racing
IAB17-23	Olympics
IAB17-24	Paintball
IAB17-25	Power & Motorcycles
IAB17-26	Pro Basketball
IAB17-27	Pro Ice Hockey
IAB17-28	Rodeo
IAB17-29	Rugby
IAB17-30	Running/Jogging
IAB17-31	Sailing
IAB17-32	Saltwater Fishing

IAB17-33	Scuba Diving
IAB17-34	Skateboarding
IAB17-35	Skiing
IAB17-36	Snowboarding
IAB17-37	Surfing/Bodyboarding
IAB17-38	Swimming
IAB17-39	Table Tennis/Ping-Pong
IAB17-40	Tennis
IAB17-41	Volleyball
IAB17-42	Walking
IAB17-43	Waterski/Wakeboard
IAB17-44	World Soccer
IAB18	**Style & Fashion**
IAB18-1	Beauty
IAB18-2	Body Art
IAB18-3	Fashion
IAB18-4	Jewelry
IAB18-5	Clothing
IAB18-6	Accessories
IAB19	**Technology & Computing**
IAB19-1	3-D Graphics
IAB19-2	Animation
IAB19-3	Antivirus Software
IAB19-4	C/C++
IAB19-5	Cameras & Camcorders
IAB19-6	Cell Phones
IAB19-7	Computer Certification
IAB19-8	Computer Networking
IAB19-9	Computer Peripherals
IAB19-10	Computer Reviews
IAB19-11	Data Centers
IAB19-12	Databases

IAB19-13	Desktop Publishing
IAB19-14	Desktop Video
IAB19-15	Email
IAB19-16	Graphics Software
IAB19-17	Home Video/DVD
IAB19-18	Internet Technology
IAB19-19	Java
IAB19-20	JavaScript
IAB19-21	Mac Support
IAB19-22	MP3/MIDI
IAB19-23	Net Conferencing
IAB19-24	Net for Beginners
IAB19-25	Network Security
IAB19-26	Palmtops/PDAs
IAB19-27	PC Support
IAB19-28	Portable
IAB19-29	Entertainment
IAB19-30	Shareware/Freeware
IAB19-31	Unix
IAB19-32	Visual Basic
IAB19-33	Web Clip Art
IAB19-34	Web Design/HTML
IAB19-35	Web Search
IAB19-36	Windows
IAB20	**Travel**
IAB20-1	Adventure Travel
IAB20-2	Africa
IAB20-3	Air Travel
IAB20-4	Australia & New Zealand
IAB20-5	Bed & Breakfasts
IAB20-6	Budget Travel
IAB20-7	Business Travel

IAB20-8	By US Locale
IAB20-9	Camping
IAB20-10	Canada
IAB20-11	Caribbean
IAB20-12	Cruises
IAB20-13	Eastern Europe
IAB20-14	Europe
IAB20-15	France
IAB20-16	Greece
IAB20-17	Honeymoons/Getaways
IAB20-18	Hotels
IAB20-19	Italy
IAB20-20	Japan
IAB20-21	Mexico & Central America
IAB20-22	National Parks
IAB20-23	South America
IAB20-24	Spas
IAB20-25	Theme Parks
IAB20-26	Traveling with Kids
IAB20-27	United Kingdom
IAB21	**Real Estate**
IAB21-1	Apartments
IAB21-2	Architects
IAB21-3	Buying/Selling Homes
IAB22	**Shopping**
IAB22-1	Contests & Freebies
IAB22-2	Couponing
IAB22-3	Comparison
IAB22-4	Engines
IAB23	**Religion & Spirituality**
IAB23-1	Alternative Religions
IAB23-2	Atheism/Agnosticism

IAB23-3	Buddhism
IAB23-4	Catholicism
IAB23-5	Christianity
IAB23-6	Hinduism
IAB23-7	Islam
IAB23-8	Judaism
IAB23-9	Latter-Day Saints
IAB23-10	Pagan/Wiccan
IAB24	Uncategorized
IAB25	Non-Standard Content
IAB25-1	Unmoderated UGC
IAB25-2	Extreme Graphic/Explicit Violence
IAB25-3	Pornography
IAB25-4	Profane Content
IAB25-5	Hate Content
IAB25-6	Under Construction
IAB25-7	Incentivized
IAB26	Illegal Content
IAB26-1	Illegal Content
IAB26-2	Warez
IAB26-3	Spyware/Malware
IAB26-4	Copyright Infringement

6.2 Banner Ad Types

The following table indicates the types of ads that can be accepted by the exchange unless restricted by publisher site settings.

Value	Description
1	XHTML text ad. (usually mobile)
2	XHTML banner ad. (usually mobile)
3	JavaScript ad; must be valid XHTML (i.e., script tags included).
4	Iframe

6.3 Creative Attributes

The following table specifies a standard list of creative attributes that can describe an ad being served or serve as restrictions of thereof.

Value	Description
1	Audio Ad (Auto Play)
2	Audio Ad (User Initiated)
3	Expandable (Automatic)
4	Expandable (User Initiated - Click)
5	Expandable (User Initiated - Rollover)
6	In-Banner Video Ad (Auto Play)
7	In-Banner Video Ad (User Initiated)
8	Pop (e.g., Over, Under, or upon Exit)
9	Provocative or Suggestive Imagery
10	Shaky, Flashing, Flickering, Extreme Animation, Smileys
11	Surveys
12	Text Only
13	User Interactive (e.g., Embedded Games)
14	Windows Dialog or Alert Style
15	Has audio on/off button
16	Ad can be skipped (e.g., skip button on preroll video)

6.4 API Frameworks

This is a list of API frameworks.

Value	Description
1	VPAID 1.0
2	VPAID 2.0
3	MRAID-1
4	ORMMA
5	MRAID-2

BEST PRACTICE: Note that MRAID-1 is a subset of MRAID-2. In OpenRTB 2.1 and prior, value #3 was "MRAID". However, not all MRAID capable APIs understand MRAID-2 features and as such the only safe interpretation of value #3 is MRAID-1. In OpenRTB 2.2, this has been made explicit and MRAID-2 has been added as value #5.

6.5 Ad Position

The following table specifies the position of the ad as a relative measure of visibility or prominence. *Note to the reader: This OpenRTB table has values derived from the IAB Quality Assurance Guidelines (QAG). Users of OpenRTB should keep in sync with updates to the QAG values as published on IAB.net. Values 3-6 apply to native apps per the mobile addendum to the version 1.5 of the QAG.*

Value	Description
0	Unknown
1	Above the fold
2	DEPRECATED - May or may not be immediately visible depending on screen size and resolution.
3	Below the fold
4	Header
5	Footer
6	Sidebar
7	Fullscreen

6.6 Video Linearity

The following table indicates the options for video linearity. "In-stream" or "linear" video refers to pre-roll, post-roll, or mid-roll video ads where the user is forced to watch ad in order to see the video content. “Overlay” or “non-linear” refer to ads that are shown on top of the video content. *Note to the reader: This OpenRTB table has values derived from the IAB Quality Assurance Guidelines (QAG). Users of OpenRTB should keep in synch with updates to the QAG values as published on IAB.net.*

This field is optional. The following is the interpretation of the bidder based upon the presence or absence of the field in the bid request:

- If no value is set, any ad (linear or not) can be present in the response.
- If a value is set, only ads of the corresponding type can be present in the response.

Value	Description
1	Linear/In-stream
2	Non-Linear/Overlay

6.7 Video Bid Response Protocols

The following table lists the options for video bid response protocols that could be supported by an exchange.

Value	Description
1	VAST 1.0
2	VAST 2.0
3	VAST 3.0
4	VAST 1.0 Wrapper
5	VAST 2.0 Wrapper
6	VAST 3.0 Wrapper

6.8 Video Playback Methods

The following table lists the various video playback methods.

Value	Description

1	Auto-play sound on
2	Auto-play sound off
3	Click-to-play
4	Mouse-over

6.9 Video Start Delay

The following table lists the various options for the video start delay. If the start delay value is greater than 0 then the position is mid-roll, and the value represents the number of seconds into the content that the ad will be displayed. If the start delay time is not available, the exchange can report the position of the ad in general terms using this table of negative numbers.

Value	Description
0	Pre-roll
-1	Generic mid-roll
-2	Generic Post-roll

6.10 Connection Type

The following table lists the various options for the connection type.

Value	Description
0	Unknown
1	Ethernet
2	Wifi
3	Cellular data – Unknown Generation
4	Cellular data – 2G
5	Cellular data – 3G
6	Cellular data – 4G

6.11 Expandable Direction

The following table lists the directions in which an expandable ad may expand, given the positioning of the ad unit on the page and constraints imposed by the content.

Value	Description
1	Left
2	Right
3	Up
4	Down
5	Fullscreen

6.12 Content Delivery Methods

The following table lists the various options for the delivery of video content.

Value	Description
1	Streaming
2	Progressive

6.13 Content Context

The following table lists the various options for the content context; what type of content is it.

Note to the reader: This OpenRTB table has values derived from the IAB Quality Assurance Guidelines (QAG). Users of OpenRTB should keep in synch with updates to the QAG values as published on IAB.net.

Value	Description
1	Video (a video file or stream that is being watched by the user, including (Internet) television broadcasts)
2	Game (an interactive software game that is being played by the user)
3	Music (an audio file or stream that is being listened to by the user, including (Internet) radio broadcasts)
4	Application (an interactive software application that is being used by the user)
5	Text (a document that is primarily textual in nature that is being read or viewed by the user, including web page, ebook, or news article)
6	Other (content type unknown or the user is consuming content which does not fit into one of the categories above)
7	Unknown

6.14 Video Quality

The following table lists the options for the video quality (as defined by the IAB – http://www.iab.net/media/file/long-form-video-final.pdf).

Value	Description
0	Unknown
1	Professionally Produced
2	Prosumer
3	User Generated (UGC)

6.15 Location Type

The following table lists the options to indicate how the geographic information was determined.

Value	Description
1	GPS/Location Services
2	IP Address
3	User provided (e.g., registration data)

6.16 Device Type

The following table lists the options to indicate how the geographic information was determined. *Note to the reader: This OpenRTB table has values derived from the IAB Quality Assurance Guidelines (QAG). Users of OpenRTB should keep in synch with updates to the QAG values as published on IAB.net.*

Value	Description
1	Mobile/Tablet
2	Personal Computer
3	Connected TV
4	Phone
5	Tablet
6	Connected Device
7	Set Top Box

6.17 VAST Companion Types

The following table lists the options to indicate markup types allowed for video companion ads. This table is derived from IAB VAST 2.0+. See www.iab.net/vast/ for more information.

Value	Description
1	Static Resource
2	HTML Resource
3	iframe Resource

6.18 QAG Media Ratings

The following table lists the media ratings using the QAG categorization. See http://www.iab.net/ne_guidelines for more information

Value	Description
1	All Audiences
2	Everyone over 12
3	Mature Audiences

6.19 No-Bid Reason Codes

The following table lists the options to signal the exchange why the impression was not bid on.

Value	Description
0	Unknown Error
1	Technical Error
2	Invalid Request
3	Known Web spider
4	Suspected Non-Human Traffic
5	Cloud, Data center, or Proxy IP
6	Unsupported Device
7	Blocked Publisher or Site
8	Unmatched user

7 Implementation Notes

The following section will provide brief notes on how certain objects and fields are to be interpreted and implemented.

7.1 COPPA Regulation Flag

The United States Federal Trade Commission has changed the compliance rules for the Children's Online Privacy Protection Act ("COPPA"), effective July 1, 2013. The proposal effects websites, and associated services), that have been identified as: (1) directed to users under 13 years of age; or (2) collecting information from users actually known to be under 13 (collectively "Children's Sites").

The FTC has written a comprehensive FAQ on the change here:

http://business.ftc.gov/documents/Complying-with-COPPA-Frequently-Asked-Questions

Steve Bellovin, CTO of the FTC, argued for a standardized signaling protocol in a blog posted dated January 2013:

http://techatftc.wordpress.com/2013/01/02/coppa-and-signaling/

Impacts

The FAQ specifically calls out these areas relevant for OpenRTB as 'Personal Information' that is not to be collected.

- Geolocation information sufficient to identify street name and name of a city or town;
- Persistent identifiers when they can be used to recognize a user over time and across different Web sites or online services.

Recommendations to Implementers

OpenRTB Exchanges and Bidders should

1. Provide a facility for sites to be declared as 'child directed'
2. Implement the regulations object extension
3. Provide facilities within campaigns to target for and against this signal
4. Degrade the Geographic information to be less exact prior to logging or transmission
5. Suppress the assignment and synchronization of identifiers (depending on usage)

It is recommended that when regs.coppa = 1, the exchange should additionally manipulate the OpenRTB bid request object as follows:

Device Object

- Suppress didmd5 and didsha1 device ID fields.
- Truncate ip field - remove lowest 8 bits.

- Truncate ipv6 field - remove lowest 32 bits.

Geo Object

- Suppress lat/long fields.
- Suppress metro, city and zip fields.

User Object

- Suppress id, buyeruid, yob, gender fields.

7.2 PMP and Direct Deals

Best Practice Bidding Logic

```
1  Receive request and parse
2  Create empty bid list for response
3  If request contains the impression[].pmp object
4    match bids against each pmp.deals[]
5    enforce targeting for dealID and seatID
6    append best M matching bids to response
7  If pmp.private_auction = False
8    match open auction bids against the request
9    append top N bids by price to response
10 Return response list to exchange
```

Recommendations

- M >= 1, preferably one per matching DealID
- N >= 2 to assist with blocking rate issues
- Minimum viable is “1+1” bidding
- Ideal is “M+N” bidding

Warning

Returning only one bid when both DealID and open auction bids are valid creates problems. The exchange side may be configured by a publisher to prioritize all DealID bids above open auction bids, or to force a price auction between them with different floors by class of bid. There are multiple common practices that depend on how the publisher prefers to sell inventory with DealID.

Policy Recommendations

- A DealID should be utilized for any situation where the auction may be awarded to a bid not on the basis of price alone. Any prioritization of bids other than by price should have a DealID.
- A DealID is recommended for all situations where a preferential floor may be assigned to a seat entity.

Anti Patterns
The below is a set of anti-patterns that OpenRTB supporting platforms have observed in various attempts to implement DealID bidding logic.

Subjecting DealID Bids to an internal auction on price
The ideal bidding logic describes a process of being liberal about sending bids. *DealID bids may not be subject to a classic price auction.* There may be an expectation that the buyer and seller want prioritization to achieve a larger objective: complete delivery of the Deal represented by the DealID. Thus any bidding logic that sorts DealID bids by price and (with or without open marketplace bids) and truncates the list too aggressively can endanger the fulfillment of the Deal.

Associating DealID to the wrong Object
A DealID should be treated as a 'targeting token' associated to orders, line-items or campaigns. If the DealID is associated to a Seat/Buyer it may create an undesired application of the DealID to many active campaigns. Alternatively if it is associated to the Advertiser it may limit that entity to only a single DealID.

Improper Handling of the Private vs Open Market Flag
The pmp.private_auction boolean flag indicates that the seller is willing or not willing to accept open market bids, ie "all bidders are welcome". If this flag is not read and interpreted correctly bid responses may be invalid. Open market bids sent to a private impression auction may be rejected and should not have been exposed to all bidders.

Improper handling of SeatIDs
If SeatIDs are treated as a filter of eligible demand partners on an open market impression, this defeats the 'all bidders are welcome' intention.

Silently Applying Margin Discounts to DealID Bids
With DealID buyers are sellers are communicating directly. The Exchange and Bidder become third-party automation platforms. If there are any automatic or silent discounts of bid prices (based upon margins or fees) set by either the exchange or the bidder, then the Deal may fail to function correctly.

Use cases
#1 Open Trading Agreement with Buyer

- Between publisher and buying entity
- Publisher sets an access rule defining the price floor for a specific buyer.
- Locked to the buyer
- Broadcast price floor
- public/open inventory
- No DealID needed (dealID is optional)
- no named advertiser(s)
- no prioritization of bids
- daily, total or freq caps optional on publisher/exchange side
- all placements, or limited to specific placements

- targeting is up to the buyer/bidder

#2 Open Trading Agreement with Buyer with Named Advertisers

- as #1 with a list of named advertisers

#3 Open Bidding with DealID as Value-added Markers

- Between publisher and buying entity
- Publisher sets a price floor for URL masked inventory.
- public/open inventory (all buyers welcome)
- DealID represents 'Package Tokens'
- Each DealID signals that the impression falls into various content and placement categories
- Floor is associated to each DealID to signal cost for usage of that Token
- Winner is decided by bid price
- execution of targeting is up to the buyer/bidder

#4 First Look Trading Agreement

- Between publisher and buying entity
- Publisher sets an access rule defining the price floor for the buyer
- locked to the buyer
- known price floor
- DealID needed
- Optional named advertiser list
- Prioritization of bids expected
- daily, total or freq caps optional on publisher/exchange side
- all placements, or limited to specific placements
- targeting is up to the buyer/bidder

#5 Direct Option Deal with Advertiser via RTB

- Between Publisher and Advertiser or their representative.
- Publisher sets a rule defining a price floor and prioritization for specific advertiser(s)
- Fill rate is expected to be greater than or equal to X%
- locked to the buyer
- private/exclusive inventory
- limited to a set list of advertiser names (generally variants of one name)
- known price floor
- DealID needed
- Prioritization of bids expected
- daily, total or freq caps freq caps will apply on bidder side. Optional on Exchange side
- limited to specific placements
- targeting is mostly enforced by buyer/bidder

#6 Direct Option Deal with Advertiser via RTB with private data

- Same as #4
- DealID represents some combination of private first-party data from the Publisher

#7 Full Fill Direct Deal with Advertiser via RTB

- Same as #4
- Fill rate is expected to be 100% or nearly so.

#8 Full Fill Direct Deal with Advertiser via RTB with private data

- Same as #6
- DealID represents some combination of private first-party data from the Publisher

7.3 No-Bid Signaling

This section covers best practices for using the optional no-bid signaling. See the table 6.19 No-Bid Reason Codes for the enumerated list.

Many exchanges support multiple response types as a no-bid:

- HTTP 204 No Content from the bidder
- An empty JSON object: "{}"
- A well formed no bid response:
  {"id":"1234567890", "seatbid":[]}
- A well formed no bid response with a reason code:
  {"id":"1234567890", "seatbid":[], "nbr ":2}

An important issue in RTB is when impressions are triggered by software robots mimicking web browsers. Such robots maybe implicitly or explicitly driving these false transactions. The following represents a set of symmetric best practices for exchanges and bidders to help recognize and reject these events.

Responsibility of the exchange
Make best effort to classify and reject "non-human traffic" requests for ads to the exchange via the following best practices:

- (Recommended) filter impressions from known spiders via user-agent classification
- (Recommended) filter impressions from suspected NHT via a 'detector'

Responsibility of the bidder

- (Recommended) no-bid impressions from known spiders via user-agent classification
- (Recommended) no-bid impressions from suspected NHT via a 'detector'
- Specify a no-bid reason code in either case.

Where

- (Exchange) Filtering the impression means that the exchange should respond to the 'ad call' with either a blank HTTP 204 response or an unpaid ad (PSA) and not offered to any bidders.
- (Bidder) Filtering the impression means that the bidder should respond with a no-bid code.

- (Both) The impression transaction records should be clearly marked in any logging systems and be removed from contributing to any event counts associated with planning, forecasting, and reporting systems.

Appendix: Additional Information

- Creative Commons / Attribution License
  http://creativecommons.org/licenses/by/3.0
- IAB (Interactive Advertising Bureau)
  http://www.iab.net
- IAB / Networks & Exchanges QA Guidelines / Content Categories
  http://www.iab.net/media/file/NE-QA-Guidelines-Final-Release-0610.pdf
- JavaScript Object Notation (JSON)
  http://www.json.org
- MMA (Mobile Marketing Association)
  http://mmaglobal.com
- OpenRTB Project
  http://code.google.com/p/openrtb
- Apache Avro
  http://avro.apache.org
- Protocol Buffers (Protobuf)
  http://code.google.com/p/protobuf