



OpenRTB Native Ads API Specification Version 1

October 2014

Simplified Edition

Introduction

The Native Ads sub-committee of the IAB OpenRTB Project assembled in May 2014 to develop a new supplementary API specification for companies interested in an open protocol for the automated trading of Native Ads enabled 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 OpenRTB 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 detailed explanation of a sub-protocol of the OpenRTB 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 native impressions** and **recommended for native impressions**). 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.

	Field	Scope	Type	Default	Description
Required parameters <u>must</u> be included.	<u>id</u>	required	<u>string</u>	-	Unique ID of the bid request, provided by the exchange.
	<u>version</u>	required	<u>string</u>	-	Open RTB version
	<u>imp</u>	required	<u>array of objects</u>	-	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.
Recommended parameters <u>should</u> be included unless there is a compelling reason to omit them.	<u>site</u>	recommended for websites	<u>object</u>	-	See Site Object
	<u>app</u>	recommended for native apps	<u>object</u>	-	See App Object
	<u>device</u>	recommended	<u>object</u>	-	See Device Object
	<u>user</u>	recommended	<u>object</u>	-	See User Object
Optional parameters <u>may</u> be included at your discretion.	<u>at</u>	<u>optional</u>	<u>string</u>	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.
	<u>tmax</u>	<u>optional</u>	<u>integer</u>	-	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.

1 Introduction

1.1 Mission / Overview

The mission of the OpenRTB Native project is to spur standardization and greater growth in the Real-Time Bidding (RTB) marketplace for Native Ads by providing open industry standards for communication between buyers of advertising and sellers of publisher inventory.

This specification is a sub-protocol of OpenRTB 2.3 to allow for the delivery of native advertising formats, as their specifics differ from publisher to publisher. In May 2013, a separate IAB subcommittee has been formed to define the request and response structures of native ad units.

Establishing a true open standard for this new format will be instrumental to native ads adoption by app publishers and demand side platforms. With a common framework on the buy-side, the industry as a whole will benefit from increased demand for native ad formats.

1.2 Credits / Project History

Neal Richter & Avinash Shahdadpuri, Rubicon Project

Jim Butler, Nexage

Adam Morgenlender & Gabor Cselle, Twitter

Narayanan Balakrishnan & Anand Narayanan, InMobi

Giuseppe Di Mauro, PubMatic

Ilya Kaplu, Visible Measures

Jennifer Lum, Adelphic

Wesley Biggs, Byyd

Benoit Grouchko & Elisabeth Rotrou, Criteo

David Hernandez, AOL

Rajaraman Periasamy, RocketFuel

Jin Yu, OpenX

1.3 Resources

Resource	Location
OpenRTB Website	http://openrtb.info

<i>OpenRTB Native Ads Project Page</i>	http://github.com/openrtb/OpenRTB/NativeAds.html
<i>Developer / Product Manager Mailing List</i>	http://groups.google.com/group/openrtb-native

1.4 Version History

Version 1.01 PUBLIC DRAFT October 2014

1.5 Terminology

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

Term	Definition
<i>Foo</i>	Term description here

2 Native Ads Basics

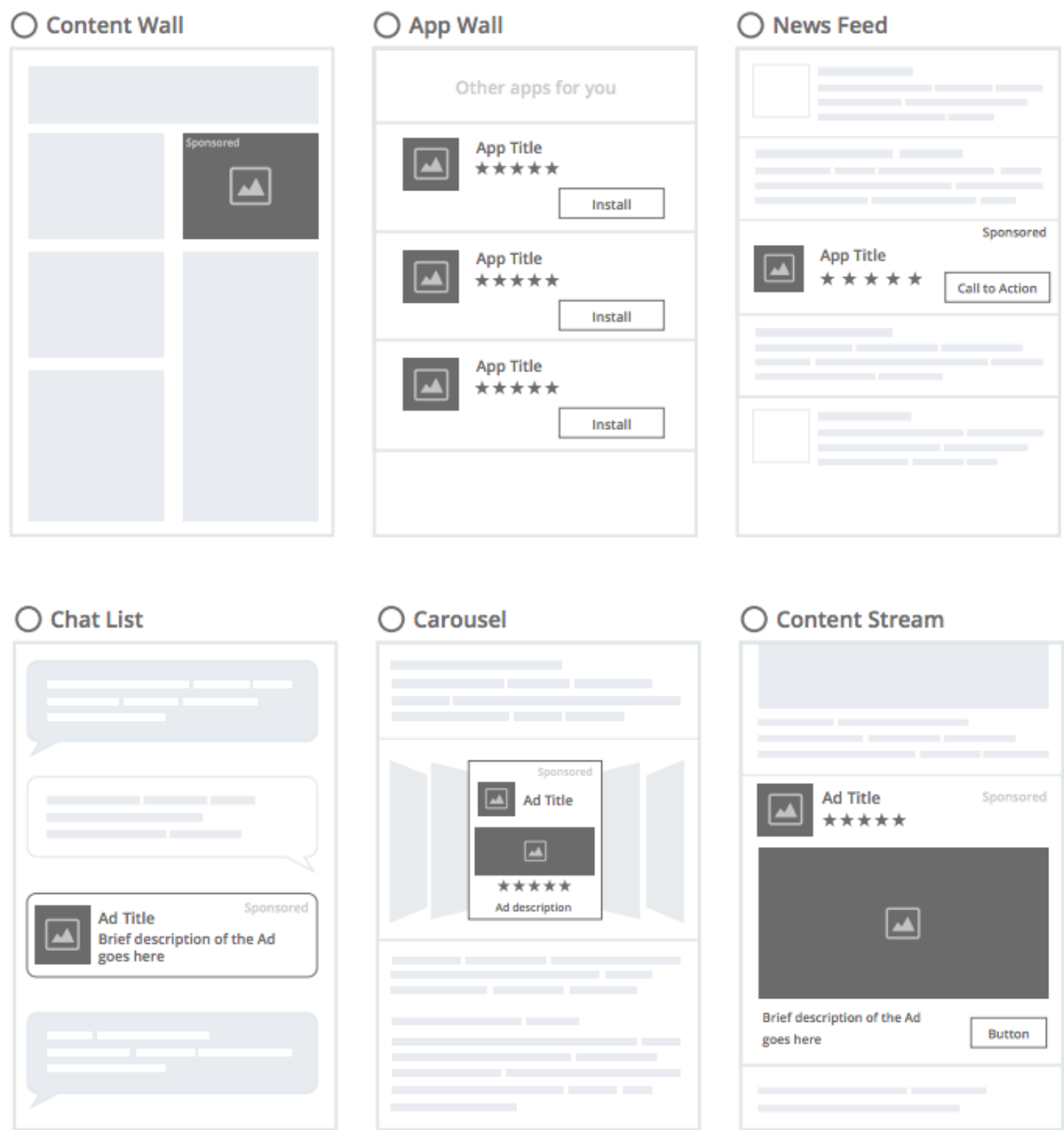
Native advertising is an online advertising method in which the advertiser attempts to gain attention by providing content in the context of the user's experience. Native ad formats match both the form and function of the user experience in which it is placed. This is in contrast to traditional banner or interstitials ads, which are displayed in a separate space of predefined and universal size, without regard to their surroundings.

2.1 IAB Core Six

The [IAB Native Advertising Playbook](#) lists six types of native ad units:

- In Feed Units
- Paid Search Units
- Recommendation Widgets
- Promoted Listings
- IAB Standard with Native Elements
- Custom / “Can’t be contained”

Some examples for native ad formats are shown below.



2.2 Data Format

As this specification outlines an optional sub-protocol of the main OpenRTB protocol payload, the format must follow that of its parent. Please refer to the main OpenRTB specification for details of various formats that may be used

2.3 Versioning

The Native Object in the Bid Request (OpenRTB 2.3) contains a “ver” field defining the version of the OpenRTB native extension.

2.4 Customization and Extensions

The OpenRTB Native Ads 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'.

2.5 Protocol Guiding Principles

The following principles guide initial protocol version and its future development:

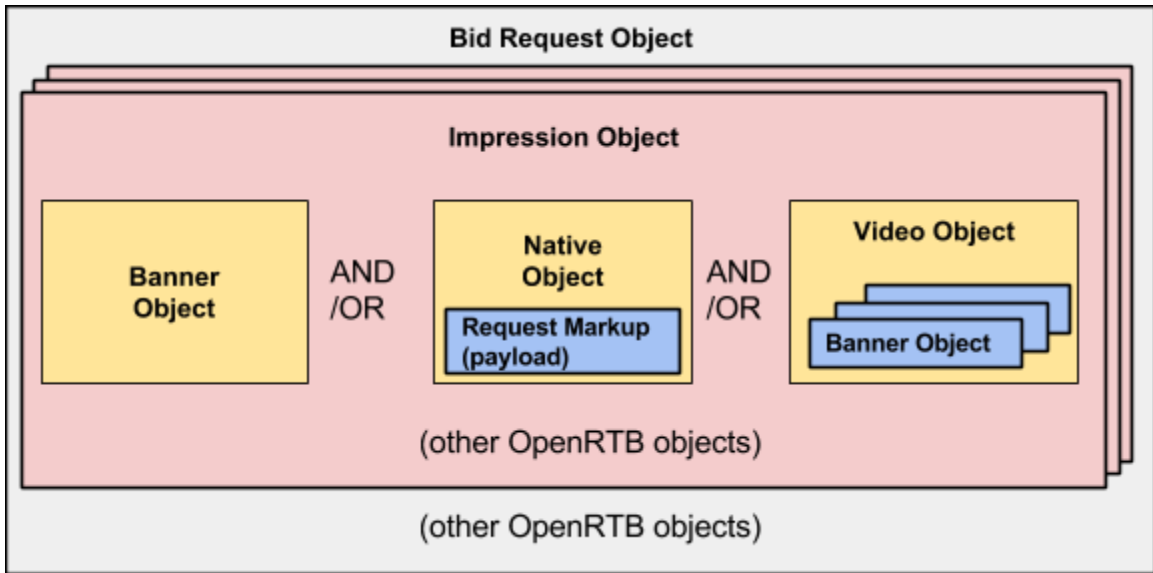
1. Assets requirements
 1. Native protocol must support assets of at least three types: text, image and video
 1. Text assets
 1. Protocol must allow text assets of various subtypes: title, description, cta, price, display URL
 2. Custom text subtypes must be allowed
 3. Maximum length of each text asset must be passed in request
 2. Image assets
 1. Protocol must support ability to provide icon and/or main image for each image asset
 2. Request must specify recommended width and height for icon and main image. Bidder should provide an image of the requested size or of requested aspect ratio.
 3. A default list of mime types is to be maintained. Request must be able to specify supported mime types if different from default.
 4. Response must specify actual width and height of image assets
 3. Video assets
 1. Protocol should implement a subset of the OpenRTB video object.
 2. Protocol must have ability to pass multiple assets of the same type (e.g. 3 images)
 3. Protocol must have an indicator for which assets are required and which are optional
 4. Each asset must be uniquely identifiable within native object in request, so response can refer to it
 5. Bidder should be able to supply optional Click URL or Call to Action(Link) for each asset.
 6. Extensibility: there must be ability to add new types of assets in future versions of the protocol
2. Protocol request must carry some indication of format of the native ad in request, e.g. sidebar, carousel, stream, so bidder can bid accordingly.

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 Native Object Hierarchy

Following is the object hierarchy for a bid request. The new Native Object is another optional element of the impression object, and can be specified as an alternative to or in conjunction with a banner object or video object.



4 Native Ad Request Markup Details

4.1 Native Markup Request Object

The Native Object defines the native advertising opportunity available for bid via this bid request. It must be included directly in the impression object if the impression offered for auction is a native ad format.

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

Field	Scope	Type	Default	Description
ver	required	integer	1	Version of the Native Markup version in use.

<i>frmtid</i>	recommended	integer	-	The Format ID of the native ad unit. See the Table of Format IDs below.
<i>plcmcnt</i>	optional	integer	1	The number of identical placements in this Format ID. If this optional parameter is present and greater than 1, then the implication is that the bidder is submitting bids to a Generalized Second Price auction where multiple identical placements are being offered in the same content feed or stream.
<i>assets</i>	required	array of objects	-	An array of AssetObjects. Any bid must comply with the array of elements expressed by the Exchange.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

4.2 AssetObject

The main container object for each asset requested or supported by Exchange on behalf of the rendering client. Any object that is required is to be flagged as such. Only one of the {title,text,icon,img,video,data} objects should be present in each object. All others should be null/absent. The id is to be unique within the AssetObject array so that the response can be aligned.

Field	Scope	Type	Default	Description
<i>id</i>	required	int	-	Unique asset ID, assigned by exchange. Typically a counter for the array.
<i>req</i>	<i>optional</i>	int	0	Set to 1 if asset is required (exchange will not accept a bid without it)
<i>type</i>	required	string	-	Type of the asset supported by the publisher. One of title,text,icon,img,video,data.

<i>title</i>	<i>optional¹</i>	object	-	Text object for title assets. See TextObject definition.
<i>text</i>	<i>optional¹</i>	object	-	Text object for text assets. See TextObject definition.
<i>icon</i>	<i>optional¹</i>	object	-	Image object for icon assets. See ImageObject definition.
<i>img</i>	<i>optional¹</i>	object	-	Image object for image assets. See ImageObject definition.
<i>video</i>	<i>optional¹</i>	object	-	Video object for video assets. See the Video request object definition. Note that in-stream video ads are not part of Native. Native ads may contain a video as the ad creative itself.
<i>data</i>	<i>optional¹</i>	object	-	Data object for ratings, prices etc. See DataObject definition.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

¹: asset object may contain only one of value, text, img, or video.

4.3 Text Object

The Text object is to be used for all textual elements of the Native ad. Examples are the Title and Text/Body of an ad.

Field	Scope	Type	Default	Description
<i>len</i>	required	integer	-	Maximum length of the text in the asset element.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

4.4 Image Object

The Image object to be used for all image elements of the Native ad such as Icons, Main Image, etc.

Field	Scope	Type	Default	Description
<i>w</i>	<i>optional</i>	integer	-	Width of the image in pixels.
<i>wmin</i>	recommended	integer	-	The minimum requested width of the image in pixels. This option should be used for any rescaling of images by the client. Either w or wmin should be transmitted. If w is included it should be considered an exact requirement.
<i>h</i>	<i>optional</i>	integer	-	Height of the image in pixels.
<i>hmin</i>	recommended	integer	-	The minimum requested height of the image in pixels. This option should be used for any rescaling of images by the client. Either h or hmin should be transmitted. If hmin is included it should be considered an exact requirement.
<i>asratio</i>	<i>optional</i>	float	-	The desired aspect ratio of the image where the ratio expresses the proportion of width/height.
<i>mime</i>	<i>optional</i>	array of strings	All types allowed	Whitelist of content MIME types supported. Popular MIME types include, but are not limited to "image/jpg" "image/gif". See Table Mime Types below for types supported by all exchange implementers. If blank, assume all types are allowed.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

4.5 Video Object

The video object to be used for all video elements supported in the Native Ad. This is a subset of the Video object of OpenRTB 2.3.

Field	Scope	Type	Default	Description
<i>linearity</i>	required	integer	-	Indicates whether the ad impression is linear or non-linear. See OpenRTB Table 6.6 Video Linearity in the OpenRTB 2.3 spec for a list of the possible values.
<i>minduration</i>	required	integer	-	Minimum video ad duration in seconds.
<i>maxduration</i>	required	integer	-	Maximum video ad duration in seconds.
<i>protocols</i>	required	array of integers	-	An array of video protocols the publisher can accept in the bid response. See OpenRTB 2.3 Table 6.7 Video Bid Response Protocols for a list of possible values.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

4.6 Data Object

The Data Object is to be used for all non-core elements of the native unit such as Ratings, Review Count, Stars, Download count etc. It is also generic for future of Native elements not contemplated at the time of the writing of this document.

Field	Scope	Type	Default	Description
<i>type</i>	required	integer	-	Type ID of the element supported by the publisher. The publisher can display this information in an appropriate format. See Table Data Asset

				Types for commonly used examples.
<i>len</i>	<i>optional</i>	integer	-	Maximum length of the text in the element's response.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

5 Native Ad Bid Response Markup

The structure and contents of the Bid Response is the same as in the OpenRTB standard. The difference is how ad creative is returned. The native creative is returned as a JSON-encoded string in the *adm* field of the Bid Object, or in response to calling the URL given in the *nurl* field of the Bid Object.

5.1 Native Ad Creative JSON

The JSON returned in *adm* or in response to *nurl* is a JSON string with the following attributes:

Field	Scope	Type	Default	Description
<i>assets</i>	required	array of objects	-	List of native ad's assets.
<i>clk</i>	required	string	-	Destination URL. Required for all native ads.
<i>fallback</i>	optional	string (URL)	-	Fallback URL for deeplink. To be used if the URL given id <i>clk</i> is not supported by the device.
<i>imptracker[]</i>	optional	array of strings	-	Array of impression tracking URLs, expected to return a 1x1 image or 204 response - typically only passed when using 3rd party trackers.
<i>ext</i>	optional	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

5.2 Asset Object

Corresponds to the Asset Object in the request. The main container object for each asset requested or supported by Exchange on behalf of the rendering client. Any object that is required is to be flagged as such. Only one of the {title,text,icon,img,video,data} objects should be present in each object. All others should be null/absent. The id is to be unique within the AssetObject array so that the response can be aligned.

Field	Scope	Type	Default	Description
<i>id</i>	required	int	-	Unique asset ID, assigned by exchange, must match one of the asset IDs in request
<i>req</i>	<i>optional</i>	int	0	Set to 1 if asset is required. (bidder requires it to be displayed).
<i>title</i>	<i>optional</i> ¹	object	-	Text object for title assets. See TextObject definition.
<i>text</i>	<i>optional</i> ¹	object	-	Text object for text assets. See TextObject definition.
<i>icon</i>	<i>optional</i> ¹	object	-	Image object for icon assets. See ImageObject definition.
<i>img</i>	<i>optional</i> ¹	object	-	Image object for image assets. See ImageObject definition.
<i>video</i>	<i>optional</i> ¹	object	-	Video object for video assets. See Video response object definition. Note that in-stream video ads are not part of Native. Native ads may contain a video as the ad creative itself.
<i>data</i>	<i>optional</i> ¹	object	-	Value object for ratings, prices etc.
<i>link</i>	<i>optional</i>	object	-	Link object for call to actions. This link is to associated to the other populated field within the object.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the

standard defined in this specification

5.3 Text Object

Corresponds to the Text Object in the request, with the value filled in. The Text Object is to be used for all textual elements of the Native ad. Examples are the Title and Text/Body of an ad.

Field	Scope	Type	Default	Description
<i>text</i>	required	String	-	The text associated with the text element.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

5.4 Image Object

Corresponds to the Image Object in the request. The Image object to be used for all image elements of the Native ad such as Icons, Main Image, etc.

Field	Scope	Type	Default	Description
<i>url</i>	required	string	-	URL of the image asset.
<i>w</i>	recommended	integer	-	Width of the image in pixels.
<i>h</i>	recommended	integer	-	Height of the image in pixels.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

5.5 Data Object

Corresponds to the Data Object in the request, with the value filled in. The Data Object is to be used for all miscellaneous elements of the native unit such as Ratings, Review Count, Stars, Downloads, Price count etc. It is also generic for future of Native elements not contemplated at the time of the writing of this document.

Field	Scope	Type	Default	Description
<i>type</i>	required	integer	-	Type ID of the element supported by the publisher. The publisher can display this information in an appropriate format. See Table Data Asset Types for commonly used examples.
<i>label</i>	<i>optional</i>	string	-	The optional formatted string name of the data type to be displayed.
<i>value</i>	required	string	-	The formatted string of data to be displayed. Can contain a formatted value such as “5 stars” or “\$10” or “3.4 stars out of 5”.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

5.6 Video Object

Corresponds to the Video Object in the request, yet containing a value of a conforming VAST tag as a value.

Field	Scope	Type	Default	Description
<i>vasttag</i>	required	string	-	Base 64 encoded vast xml.

5.7 Link Object

Used for ‘call to action’ assets, or other links from the Native ad. This Object should be associated to its peer object in the parent Asset Object. When that peer object is activated (clicked) the action should take the user to the location of the link.

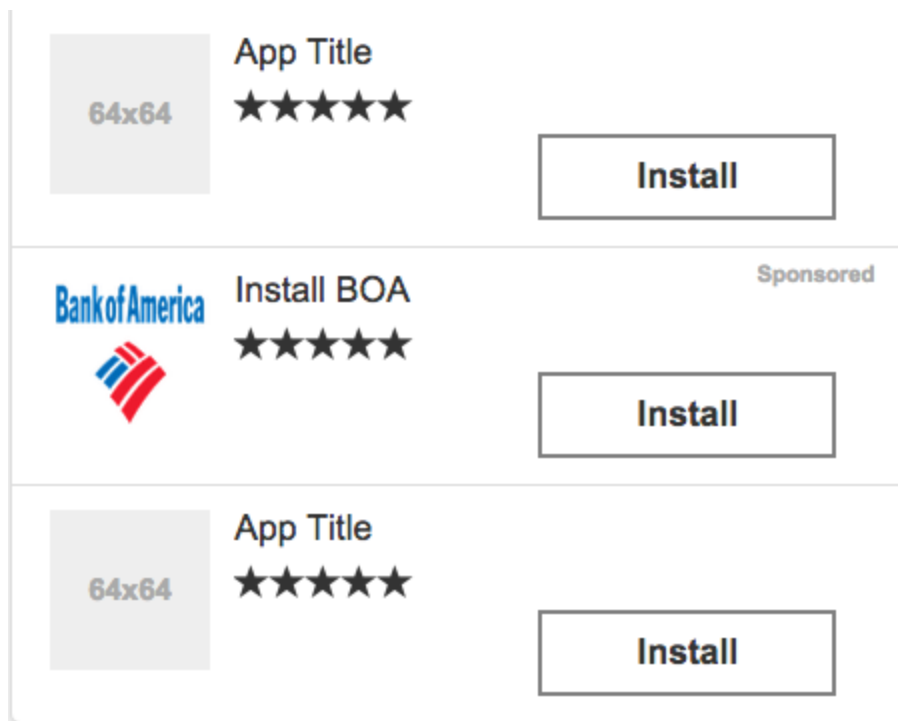
Field	Scope	Type	Default	Description
<i>url</i>	required	string	-	Landing URL of the clickable link.

<i>clktrck[]</i>	<i>optional</i>	array of strings	-	List of third-party tracker URLs to be fired on click of the URL.
<i>ext</i>	<i>optional</i>	object	-	This object is a placeholder that may contain custom JSON agreed to by the parties to support flexibility beyond the standard defined in this specification

6 Bid Request/Response Samples

6.1 App Wall Example

The ad might look like -



Bid Request

```
{
  "native": {
    "request": "http",
    "assets": [
      {
        "id": 1,
```

```

        "req": 1,
        "type": "title",
        "title": {
            "len": 30
        }
    },
    {
        "id": 2,
        "req": 0,
        "type": "data",
        "data": {
            "type": 3,
            "len": 10
        }
    },
    {
        "id": 3,
        "req": 1,
        "type": "icon",
        "icon": {
            "w": 64,
            "h": 64,
            "mime": [
                "image/png"
            ]
        }
    },
    {
        "id": 4,
        "req": 0,
        "type": "text",
        "text": {
            "len": 10
        }
    }
]
}

```

Bid Response

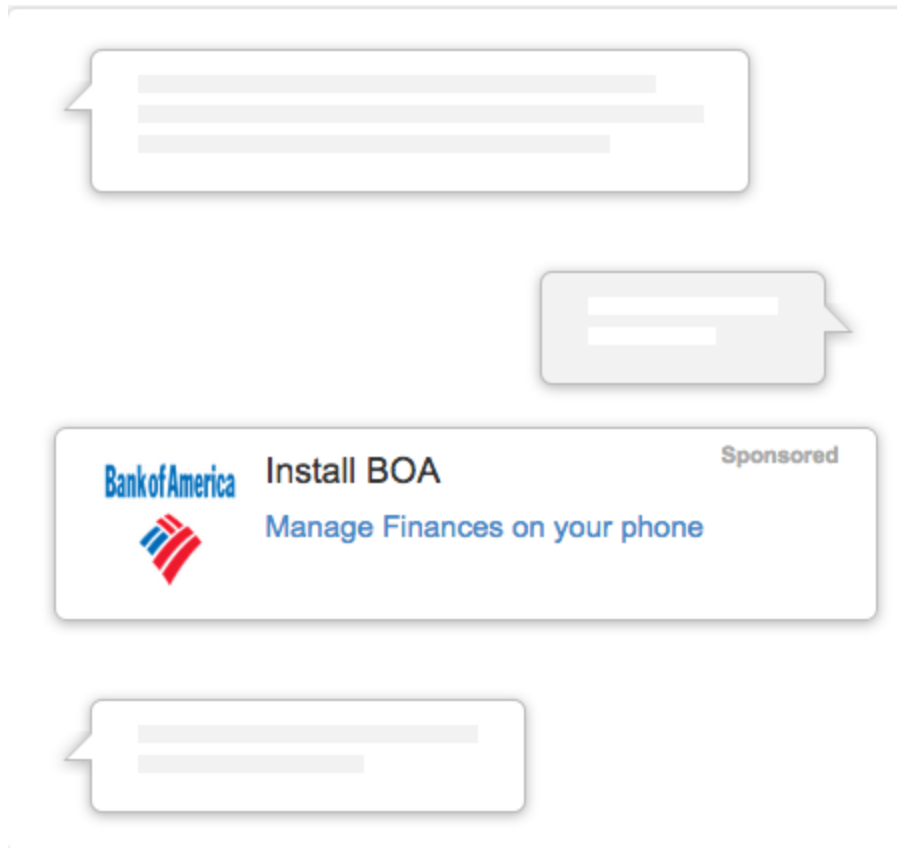
```

{
    "clk": "deeplink://deeplink/url/into/app\\"fallback\\":
    \"https://itunes.apple.com/us/app/swing-copters/id905639750?mt=8\",
    "imptracker": [
        "http://a.com/a",
        "http://b.com/b"
    ]
}

```

```
],
"assets": [
  {
    "id": 1,
    "title": {
      "text": "Install BOA"
    },
    "link": {
      "url": "http://i.am.a/URL"
    }
  },
  {
    "id": 2,
    "data": {
      "type": "3",
      "value": 5
    }
  },
  {
    "id": 3,
    "icon": {
      "url": "http://cdn.mobad.com/ad.png",
      "w": 64,
      "h": 64
    }
  },
  {
    "id": 4,
    "text": {
      "text": "Install"
    },
    "link": {
      "url": "http://i.am.a/URL"
    }
  }
]
}
```

6.2 Chat List Example



Bid Request

```
{
  "native": {
    "frmtid": 4,
    "request": "http",
    "assets": [
      {
        "id": 1,
        "req": 1,
        "type": "title",
        "title": {
          "len": 30
        }
      },
      {
        "id": 2,
        "req": 0,
        "type": "text",
```

```

        "text": {
            "len": 100
        }
    },
    {
        "id": 3,
        "req": 1,
        "type": "icon",
        "icon": {
            "w": 64,
            "h": 64,
            "mime": [
                "image/png"
            ]
        }
    }
]
}
}

```

Bid Response

```

{
    "clk": "deeplink://deeplink/url/into/app\\"fallback\\":
    \"https://itunes.apple.com/us/app/swing-copters/id905639750?mt=8\",
    "imptracker": [
        "http://a.com/a",
        "http://b.com/b"
    ],
    "assets": [
        {
            "id": 1,
            "title": {
                "text": "Install BOA"
            }
        },
        {
            "id": 2,
            "text": {
                "text": "Manage Finances on your phone"
            }
        },
        {
            "id": 3,
            "icon": {
                "url": "http://cdn.mobad.com/ad.png",
                "w": 64,

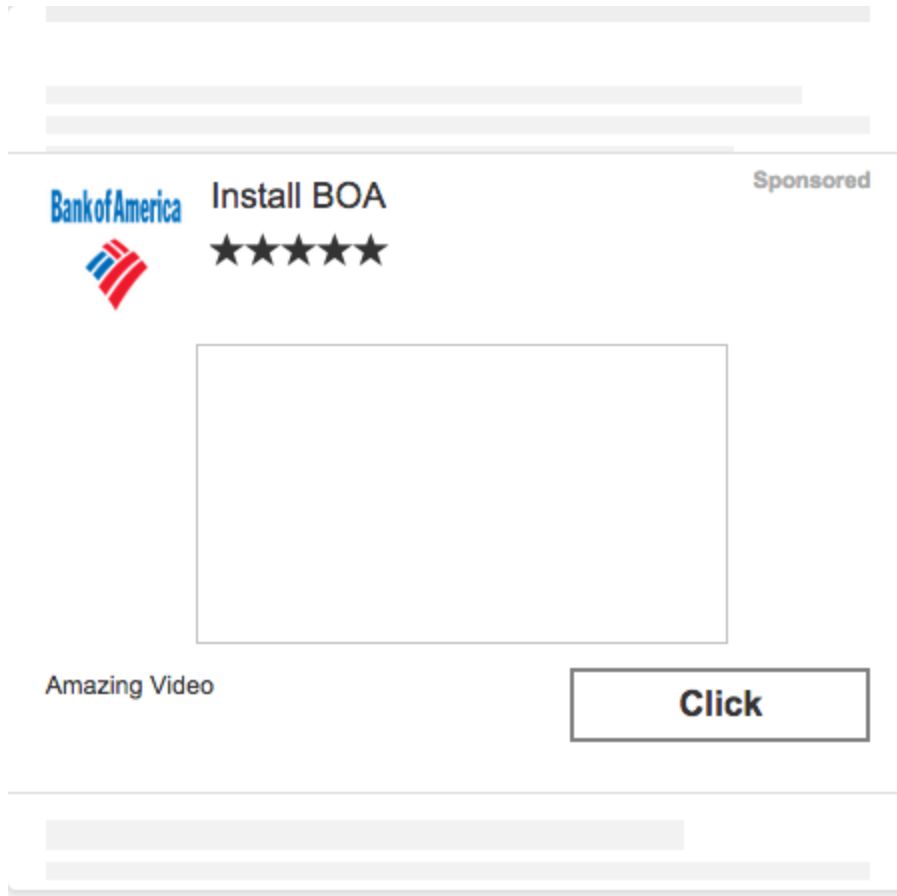
```

```

        "h": 64
      }
    }
  ]
}

```

6.3 Content Stream with Video Element Example



Bid Request

```

{
  "native": {
    "frmtid": 6,
    "request": "http",
    "assets": [
      {
        "id": 1,
        "req": 1,
        "type": "title",
        "title": {
          "len": 30
        }
      }
    ]
  }
}

```



```
    }
  },
  {
    "id": 2,
    "req": 0,
    "type": "data",
    "data": {
      "type": 3,
      "len": 10
    }
  },
  {
    "id": 3,
    "req": 1,
    "type": "image",
    "image": {
      "w": 1200,
      "h": 627,
      "mime": [
        "image/png"
      ]
    }
  },
  {
    "id": 4,
    "type": "video",
    "video": {
      "linearity": 1,
      "minduration": 15,
      "maxduration": 30,
      "protocols": [
        "VAST 2.0"
      ]
    }
  },
  {
    "id": 5,
    "req": 0,
    "type": "text",
    "text": {
      "len": 10
    }
  }
]
}
```

Bid Response

```
{
  "clk": "deeplink://deeplink/url/into/app\\"fallback\\":
  \"https://itunes.apple.com/us/app/swing-copters/id905639750?mt=8\",
  "imptracker": [
    "http://a.com/a",
    "http://b.com/b"
  ],
  "assets": [
    {
      "id": 1,
      "title": {
        "text": "Install BOA"
      }
    },
    {
      "id": 2,
      "data": {
        "type": "3",
        "value": 5
      }
    },
    {
      "id": 3,
      "image": {
        "url": "http://cdn.mobad.com/ad.png",
        "w": 1200,
        "h": 627
      }
    },
    {
      "id": 4,
      "video": {
        "vasttag": "<VAST version='2.0'></VAST>"
      }
    },
    {
      "id": 5,
      "text": {
        "text": "Click"
      },
      "link": {
        "url": "http://i.am.a/URL"
      }
    }
  ]
}
```

7 Reference Lists/Enumerations

7.1 Native Format IDs

Below is a list of the core 6 formats described in the introduction above.

An implementing exchange may not support all asset variants or introduce new ones unique to that system.

Format ID	Description
1	Content Wall
2	App Wall
3	News Feed
4	Chat List
5	Carousel
6	Content Stream
500+	Reserved for Exchange specific formats.

7.2 Data Asset Types

Below is a list of common asset element types of native advertising at the time of writing this spec. This list is non-exhaustive and intended to be extended by the buyers and sellers as the format evolves.

An implementing exchange may not support all asset variants or introduce new ones unique to that system.

Type ID	Name	Description	Format
---------	------	-------------	--------

1	sponsored	Sponsored By message where response should contain the brand name of the sponsor.	text
2	desc	Descriptive text associated with the product or service being advertised.	text
3	rating	Rating of the product being offered to the user. For example an app's rating in an app store from 0-5.	number formatted as string
4	likes	Number of social ratings or "likes" of the product being offered to the user.	number formatted as string
5	downloads	Number downloads/installs of this product	number formatted as string
6	price	Price for product / app / in-app purchase. Value should include currency symbol in localised format.	number formatted as string
7	saleprice	Sale price that can be used together with price to indicate a discounted price compared to a regular price. Value should include currency symbol in localised format.	number formatted as string
8	phone	Phone number	formatted string
9	address	Address	text
500+	XXX	Reserved for Exchange specific usage numbered above 500	Unknown

7.3 Mime Types

This table is for reference on common mime types to be used for the Image Object. Each implementing Exchange should have their own list of supported types in the integration docs. See [Wikipedia's MIME page](#) for more information and links to all IETF RFCs.