

# AdChoices?

## Compliance with Online Behavioral Advertising Notice and Choice Requirements

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**Abstract.** Online behavioral advertisers track users across websites, often without users’ knowledge. Over the last twelve years, the online behavioral advertising industry has responded to the resulting privacy concerns and pressure from the FTC by creating private self-regulatory bodies. These include the Network Advertising Initiative (NAI) and an umbrella organization known as the Digital Advertising Alliance (DAA). In this paper, we enumerate the notice and choice requirements the DAA and NAI place on their members and check for compliance with those requirements by examining members’ privacy policies and reviewing ads on the top 100 websites. We also test DAA and NAI opt-out mechanisms and categorize how their members define opting out. Our results show that most members are in compliance with some of the notice and choice requirements, but there are numerous instances of non-compliance. Most examples of non-compliance are related to the “enhanced notice” requirement, which requires advertisers to mark behavioral ads with a link to further information and a means of opting out.

**Keywords:** Online behavioral advertising; privacy; consumer choice; notice; public policy

## 1 Introduction

The Federal Trade Commission (FTC) defines online behavioral advertising (OBA) as “the practice of tracking consumers’ activities online to target advertising” [12]. The FTC has been examining ways to reduce the privacy concerns associated with OBA for over a decade.

In 1999, a group of companies engaging in OBA announced the launch of a self-regulatory organization called the Network Advertising Initiative (NAI) and proposed a set of principles to the FTC. In a July 2000 report the FTC acknowledged that “the NAI principles present a solid self-regulatory scheme,” but nonetheless recommended legislation to provide a basic level of privacy protection [11]. This legislation was never enacted [14]. The NAI published its principles in 2001 and revised them in 2008 [27]. Today, the NAI has 66 member

companies<sup>1</sup> and offers a consumer opt-out service [29] that allows consumers “to ‘opt out’ of the behavioral advertising delivered by our member companies.”<sup>2</sup>

As the FTC began examining OBA again in 2009, several industry organizations with an interest in OBA (including the NAI) formed the Digital Advertising Alliance (DAA).<sup>3</sup> In July 2009 the DAA published its own set of requirements, the *Self-Regulatory Principles for Online Behavioral Advertising* [7], in an effort to avoid an FTC push for new legislation [6]. The self-regulatory program based on the DAA principles document was announced in October 2010. According to a Better Business Bureau announcement [1]:

the Principles and practices represent the industry’s response to the Federal Trade Commission’s call for more robust and effective self-regulation of online behavioral advertising practices that would foster transparency, knowledge and choice for consumers.

As the FTC determines what to do next, it is useful to evaluate the effectiveness of industry self-regulation to date. In this paper, we focus on the effectiveness of notice and opt-out, and quantify DAA and NAI member compliance with these self-regulatory requirements. We check for compliance by examining websites showing advertisements, advertising network websites, and the cookies produced by the DAA and NAI opt-out mechanisms.

The remainder of our paper is organized as follows. We present background and related work in Section 2. Section 3 discusses the DAA and NAI requirements we investigate. We outline our methodology in Section 4 and present our findings in Section 5. Finally, we conclude with a discussion in Section 6.

## 2 Background and Related Work

Online behavioral advertising is a form of advertising in which advertising networks construct profiles of users as they navigate various websites [9]. The purpose of this tracking is to present each user with advertisements expected to be related to his or her interests [8]. HTTP cookies are the primary mechanism for executing this tracking, though it is possible to do so using other technologies such as JavaScript cookies or Flash Local Shared Objects (LSOs).

While OBA practitioners claim it benefits consumers [33], for example by funding website content, the FTC notes that behavioral advertising raises privacy concerns among consumers, including [14]:

...the invisibility of the data collection to consumers; the shortcomings of current disclosures about the practice; the potential to develop and store detailed profiles about consumers; and the risk that data collected for behavioral advertising – including sensitive data regarding health,

<sup>1</sup> The full NAI membership list is available online at <http://www.networkadvertising.org/participating/>

<sup>2</sup> [http://www.networkadvertising.org/managing/opt\\_out.asp](http://www.networkadvertising.org/managing/opt_out.asp)

<sup>3</sup> For a list of affiliated organizations see <http://www.aboutads.info/associations>

finances, or children – could fall into the wrong hands or be used for unanticipated purposes.

In a 2009 study, Turow et al. [36] found that the majority of American adults did not want advertisements to be targeted toward their interests, even if done anonymously. They also found that most Americans believe a law should require advertisers “to immediately delete information about their internet activity.” In a 2010 study by McDonald et al., over 60% of more than 300 participants saw online behavioral advertising as “invasive” [24].

Google counsel Pablo Chavez reported on Google’s OBA opt-out mechanism, which also allows users to modify their interest categories [2]:

for every user that has opted out, about four change their interest categories and remain opted in, and about ten do nothing. We take from this that online users appreciate transparency and control, and become more comfortable with data collection and use when they feel it happens on their terms and in full view.

Other research has examined online self-regulatory mechanisms. McDonald et al. explored the cost of reading online privacy policies. They discovered that, despite being a self-regulatory mechanism designed to provide users with notice, website privacy policies were so verbose and densely written that it would be unreasonable for a typical user to read the privacy policy of each website visited [23]. The Platform for Privacy Preferences (P3P) is a self-regulatory mechanism for websites to communicate their privacy policies to user agents so users do not have to read them [4]. Leon et al. discovered that thousands of websites use P3P compact policies to misrepresent their privacy practices [22]. Reay et al. examined P3P policies of websites and compared them with the legal requirements of the websites’ jurisdictions. They found that websites often do not claim to follow legal privacy-related requirements [32].

Prior research has examined the usability of self-regulatory privacy mechanisms. McDonald et al. found that only 11% of study participants were able to determine the function of the NAI opt-out website [24]. Further, the Annenberg Public Policy Center reports that many users misunderstand the purpose of website privacy policies. Their report states that over half of users believe that a website having a privacy policy means the website in question will not share data [35].

The NAI principles document highlights the importance of NAI members adhering to the principles [27]:

NAI members believe that self imposed constraints help achieve the balance needed to preserve consumer confidence in the use of this revolutionary medium. Even where there is reduced privacy impact in use of anonymous or anonymized data, the NAI recognizes that consumers will only trust and continue to engage with advertisers online when there is appropriate deference shown to consumers’ concerns about the privacy of their websurfing experience.

The NAI states that they rely in part on consumers to report violations [26].

The NAI’s *2010 Annual Compliance Report* examines the 34 NAI companies who were members at the start of 2010. The report found that “the vast majority of evaluated member companies met their compliance obligations.” However, the report also indicated that there were instances of opt-out mechanisms failing and failure of members to observe requirements pertaining to “non-cookie technologies.” There was also a member using sensitive health-related information to target ads without opt-in consent, as the NAI requires. The document states that the NAI is working on policy changes to address their findings [30].

The NAI compliance report also indicates that one NAI member withdrew its membership [30]. This highlights one potential problem with self-regulatory organizations: members who do not wish to follow the self-regulation process can simply leave. The FTC expressed this concern in 2000 [11]:

For while NAI’s current membership constitutes over 90% of the network advertising industry in terms of revenue and ads served, only legislation can compel the remaining 10% of the industry to comply with fair information practice principles. Self-regulation cannot address recalcitrant and bad actors, new entrants to the market, and drop-outs from the self-regulatory program.

The “do not track” mechanism has been proposed as a mechanism to allow privacy-concerned users to avoid OBA tracking [10], and Jon Leibowitz, chairman of the FTC, has expressed his support [21]. A recent release of Mozilla Firefox includes a “do not track” feature that signals to visited websites that the user does not wish to be tracked [25]. Likewise, Microsoft Internet Explorer 9 includes a do not track header as well as a feature called “tracking protection” [17]. Google has also introduced a Chrome extension which enables users to retain persistent opt-out cookies [18]. The do-not-track and opt-out mechanisms both rely on website operators to honor user preferences.

### 3 DAA and NAI Requirements Investigated

In this section we discuss the DAA and NAI principles in more detail, and focus on the notice and choice requirements that we investigate in this study.

The DAA principles are contained in a 48-page document, published in 2009 [7]. This document presents seven principles along with commentary and implementation guidance. The NAI principles are contained in a 12-page document, last revised in 2008 [27]. This document describes ten principles, and does not include the more extensive commentary and implementation details of the DAA principles document. The principles documents are not exhaustive lists of either organization’s requirements, as we discuss below.

We examined the DAA principles document to determine which principles lend themselves to compliance checks through inspection of websites, privacy policies, advertisements, and cookies.

- *Education Principle*: The DAA must maintain a central educational website and provide educational ads. The educational website is the DAA website itself<sup>4</sup> and we are unable to check requirements about educational ads.
- *Transparency Principle*: Companies must provide certain information on their websites and in ads. We are able to check this principle through inspection of websites and advertisements.
- *Consumer Control Principle*: Companies must provide a mechanism for opting out of data collection for online behavioral advertising. We can check this through examination of opt-out cookies.
- *Security Data Principle*: This sets forth requirements for data security. We are unable to check this because it pertains to internal practices.
- *Material Changes Principle*: Companies must obtain consent before making certain changes to their practices. We are unable to check this because we do not know when companies change their practices or what steps they are taking to obtain consent.
- *Sensitive Data Principle*: Companies must take additional steps when handling sensitive data. We cannot check this because we do not know what data a given company may have or what steps they take to handle it.
- *Accountability Principle*: The industry must develop compliance programs. The Direct Marketing Association and Council of Better Business Bureaus are developing such programs [1], but a review of these programs is beyond the scope of this paper.

The NAI principles document contains similar principles as well as some additional principles that are not relevant to our analysis.

The DAA Transparency Principle requires that companies “give clear, meaningful, and prominent notice on their own Web sites that describes their Online Behavioral Advertising data collection and use practices.” Companies must indicate “the types of data collected online,” “the uses of such data,” a “mechanism for exercising choice” about data collection and use for online behavioral advertising, and “the fact that they adhere to these principles.” The NAI principles also require the above, except for members stating that they adhere to the DAA principles. In addition, the NAI principles require that a member disclose what online behavioral advertising activity it performs, and the approximate duration for which it retains data for online behavioral advertising.

The DAA’s Transparency Principle includes an “enhanced notice” provision, requiring that websites on which behavioral advertising data is collected or used provide a “clear, meaningful and prominent link” to a “disclosure” about online advertising. This link must appear on every page “where OBA data is collected or used.” This disclosure must contain either a list of advertisers collecting data and corresponding links, or “a link to an industry-developed Web site” containing certain information. A link to the DAA website satisfies this condition.

The DAA principles require no specific icon, and none is depicted in the document itself; however, it does mention “common wording and a link/icon that

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<sup>4</sup> <http://www.aboutads.info/>

consumers will come to recognize” [7]. In January 2010, the industry introduced the “Power I” icon to denote online behavioral advertising [3]. This symbol was selected based on the results of a research study commissioned by the Future of Privacy Forum [19]. Nine months later, the industry announced a new “Advertising Option Icon” [37]. Both the original and new icons are shown in Figure 1. The Ad Option Icon may be licensed for a fee from the DAA (although web publishers with annual revenues from online behavioral advertising of less than \$2,000,000 are permitted to use it for free).<sup>5</sup>



**Fig. 1.** A Progressive ad (left) and a Geico ad (right) displaying the Power I and Advertising Option Icon, respectively.

The DAA Consumer Control principle requires that members “provide consumers with the ability to exercise choice with respect to the collection and use of data for Online Behavioral Advertising purposes.” This must be available from one of a number of locations, including the privacy notice. Likewise, the NAI requires that its members using non-personally identifiable information for OBA provide users with an opt-out mechanism, both on the member website and on the NAI website. Further, while the DAA and NAI principles documents do not mention this, the NAI [28] and DAA<sup>6</sup> both require that opt-out cookies persist for at least five years.

We also note that in 2009 the FTC narrowed its focus to third-party behavioral advertising [15]. Thus, the DAA considers online behavioral advertising to occur only “across non-Affiliate Websites” [7]. The DAA states that the principles do not cover “activities of First Parties (Web site publishers / operators) that are limited to their own sites or affiliated sites over which they exercise direct control” [5]. The NAI defines online behavioral advertising as “third-party online behavioral advertising” [27]. Thus a website can still track and target ads at a user who has opted out, if the user is on the ad network’s own website.

Based on this analysis, we compiled a set of 10 requirements to check for this study. This list of requirements is shown in Table 1.

## 4 Methodology

In February and March 2011, we analyzed the 66 NAI members listed on the NAI website as of February 21, 2011 for compliance with the requirements in

<sup>5</sup> <http://www.aboutads.info/participants/icon>

<sup>6</sup> <http://www.aboutads.info/how-interest-based-ads-work/what-are-opt-out-cookies-and-how-do-they-remember-opt-out-preferences>

**Table 1.** Requirements we checked for each NAI member.

Requirement	Source	How Checked
<b>Privacy notice requirements</b>		
Types of data collected	DAA+NAI	Member website
Usage of collected data	DAA+NAI	Member website
Presence of opt-out mechanism	DAA+NAI	Member website
Adherence to DAA principles	DAA	Member website
Behavioral advertising activities	NAI	Member website
How long data is retained	NAI	Member website
<b>Enhanced notice requirement</b>		
Advertisements contain enhanced notice	DAA	Quantcast top 100
<b>Opt-out cookie requirement</b>		
Cookie present in DAA opt-out mechanism	DAA	DAA mechanism
Cookie present in NAI opt-out mechanism	NAI	NAI mechanism
Cookie duration is at least five years	DAA+NAI	Both mechanisms

Table 1. We repeated our examination in August of 2011. We examined member websites for the privacy notice requirements by examining the front page of each member’s website, their privacy policy, and any relevant links from that policy. We considered the requirement that members state what types of data they collect for behavioral advertising satisfied if the privacy policy provided a general description of what data is collected or an example. We considered the requirement that a member disclose how long it retains data for behavioral advertising satisfied even if the member stated it retains data indefinitely. However, we did not consider the requirement satisfied if a member disclosed only cookie or log file expiration information.

We examined the opt-out cookies from the DAA<sup>7</sup> and NAI<sup>8</sup> opt-out mechanisms, in February 2011 and in Summer 2011. We checked that both mechanisms successfully placed opt-out cookies for each NAI member, checked whether the two mechanisms provided the same cookies, and checked whether the cookies had a duration of at least five years.

In mid-March 2011 we checked compliance with the enhanced notice requirement of the DAA principles by inspecting advertisements on websites on Quantcast’s February 2011 U.S. list of top 100 websites [31]. We repeated this in August 2011. We navigated to the root page for each of these websites, and then to first three links (from top to bottom, left to right) pointing to non-search pages in the same domain. To record which advertising networks were associated with each page, we used the Firefox web browser with the TACO add-on,<sup>9</sup> which enables users to observe the advertising networks on each website.

The enhanced notice requirement of the DAA applies only to behavioral advertisements. It is nearly impossible to determine if a given ad is behavioral by visual inspection, and TACO indicates whether an ad network is present on a website but not whether a specific ad is behavioral. In order to remove

<sup>7</sup> <http://www.aboutads.info/choices/>

<sup>8</sup> [http://www.networkadvertising.org/managing/opt\\_out.asp](http://www.networkadvertising.org/managing/opt_out.asp)

<sup>9</sup> <http://www.abine.com/preview/taco.php>

from consideration ads that were unlikely to be behavioral, we excluded ads on websites where TACO did not recognize an ad network. In addition, we excluded ads that the DAA requirements likely would not cover because they appeared (based on our judgement) to be contextual ads, “based on the content of the Web page being visited, a consumer’s current visit to a Web page, or a search query” [7]. For example, we excluded ads for Comcast products on `comcast.com` and ads for drugs on `webmd.com`.

Industry estimates suggest that we can reasonably assume that about 80% of advertisements we encounter are behavioral. Omar Tawakol, CEO of BlueKai, stated recently that “eighty percent of online ads rely on third-party cookies for some form of audience targeting” [34]. Likewise, the Interactive Advertising Bureau stated “in an IAB survey of ad agencies conducted earlier this year, we found that 80% or more of digital advertising campaigns were touched by behavioral targeting in some way” [20]. On the other hand, industry representatives distinguish between different types of targeted advertising, and Tawakol has stated that “the majority of third party cookie use for targeting actually isn’t traditionally called behavioral advertising” [13]. It is not entirely clear which targeted ads and third-party cookies are actually subject to self-regulatory requirements.

At each website on the Quantcast top 100 list we did the following:

1. Create a new Firefox profile (this clears cookies and the cache) and clear Flash LSOs.
2. Copy and paste the URL for the given website from the Quantcast list.
3. Check for the presence of non-contextual ads (ads not related to the visited website or the content of the current page).
4. If there are non-contextual ads, check them for compliance with the DAA principles and record the tracking websites TACO lists for the page.
5. If there is a privacy notice associated with advertisements, follow the link and record its data.
6. Repeat steps 3 through 5 for the first three non-search links on the page.

## 5 Results

We present the results of this paper in four parts. In Section 5.1, we present the evidence of “enhanced notice” we found while visiting Quantcast’s top 100 websites. In Section 5.2, we present our findings for compliance with “privacy notice” requirements. We evaluate the DAA and NAI opt-out mechanisms in Section 5.3. Finally, in Section 5.4 we look at how different NAI members define opting out. For all requirements we check, we present rates of compliance and indicate which members were not compliant.

### 5.1 Enhanced Notice Requirement

We looked for non-contextual ads on 400 web pages across 100 websites. We found 164 pages across 50 websites that contained non-contextual ads and were



monitored by NAI members. We focus on NAI members since they all describe themselves as engaged in OBA and are required to follow both DAA and NAI requirements. Using TACO to determine who monitored each page, we found an average of 2.8 NAI members identified per page.

The “enhanced notice” requirement of the DAA’s Transparency principle requires that notice be placed on the same page where behavioral ads appear [7]. Using the methodology described in Section 4, we searched for evidence of this notice on each of the 164 pages. We found enhanced notice on 35% of these pages, including those which complied simply by adding a link to the bottom of each page. Since we expect that about 80% of advertisements are behavioral, this represents a significant gap in compliance with the enhanced notice requirement. Specifically, we found 45 pages that provided enhanced notice near at least one advertisement, with 29 of these pages providing enhanced notice near every ad on the page. These notices identified the ad provider for each ad. In addition, 12 pages (on three websites) provided notice with a single link at the bottom of the page. This link does not list the advertising providers for each ad on the page, and is arguably not very prominent since it may require a large amount of scrolling to find. Evidence of notice was also inconsistent across pages on a single site. Aside from the three sites that provided a single link at the bottom of the page, seven websites displayed enhanced notice on all four pages that we visited, with an additional 15 websites providing notice on at least one page. We even observed a mixing of notice styles across pages on a single site. Table 2 lists the type of enhanced notice found on each of the top websites where we observed non-contextual ads.

TACO identified trackers from 23 NAI members on the pages we examined. When TACO found NAI members tracking a page that had non-contextual ads, we expected to find at least one enhanced notice. We observed four members only on pages with enhanced notice: interCLICK, Microsoft, SpecificMEDIA, and Traffic Marketplace. We observed 16 others on pages with and without enhanced notice. We observed three others only on pages without enhanced notice. Table 3 presents detailed results for each NAI member. For the 45 instances of enhanced notice that identified the ad provider, Google was identified in 11 cases. We also observed, in decreasing order of prevalence, enhanced notice from Yahoo!, AOL Advertising, SpecificMEDIA, Microsoft, interCLICK, BlueKai, Collective, and Traffic Marketplace. The remaining five notices mentioned CBS Interactive and DoubleVerify presenting the ad but did not identify an NAI member, even though NAI members were identified as tracking those pages.

Notably, much of the enhanced notice appeared to be driven by advertisers (i.e. the companies that purchase ads) rather than by NAI members. For example, almost all of the Verizon ads we saw had enhanced notice, even though they came from many different ad providers: AOL Advertising, Collective, Google, interCLICK, and Traffic Marketplace. This suggests that some online advertising buyers are interested in providing notice and choice to their customers.

## 5.2 Privacy Notice Requirement

We checked the privacy policies of the 66 NAI members for compliance with the privacy notice requirements from Table 1 in February 2011. Audience Science is the only NAI member that states that it adheres to the DAA principles, and thus it is the only member fully compliant with the privacy notice requirements we checked. Excluding the requirement to mention adherence to the DAA principles, 55 members (83%) are compliant with the privacy notice requirements.

All NAI members mention their OBA activities, how collected data is used, and all provide an opt-out mechanism. All except Fox Audience Network state what types of data they collect for behavioral advertising. Only 56 members (85%) state how long they retain their data collected for behavioral advertising. Many members mention cookie or log file expiration but this does not address the data collected from observing cookies or analyzing log files. Privacy notice requirement compliance for each NAI member is presented in Table 4.

## 5.3 Choice Requirement

We evaluated the NAI and DAA opt-out mechanisms in February and March 2011, with 26 days between checks. The DAA mechanism reported that it failed to set an opt-out cookie for one company when we tested it in February with the Microsoft Windows operating system, using the Chrome 9.0.597, Internet Explorer 8.0.6001.19019, and Firefox 3.6.13 browsers. In all three cases, one company failed, but surprisingly it was not the same company each time. On Chrome and Internet Explorer, the DAA mechanism was unable to set the opt-out cookie for AOL Advertising, the third most pervasive online advertiser [16]. On Firefox, the mechanism failed for Audience Science. The NAI mechanism was able to set all opt-out cookies successfully. In March, we retested the DAA mechanism and found the Invite Media opt-out cookie could not be set on Chrome 10.0.648, but the mechanism worked with the other browsers.

We also observed that the two opt-out mechanisms sometimes set different cookies, and some opt-out cookies changed from February to March. Even when both mechanisms set cookies for the same advertiser, they did not always agree on the content of the cookie or the number of cookies that were set. For example, the NAI mechanism set four cookies for the domain `adsonar.com`, a serving domain of AOL Advertising. These cookies had the names: `TData`, `TData2`, `atdemo`, and `atdemo2`. For the same domain, the DAA mechanism set a single cookie with the name `oo_flag`. This did not change between February and March. Since these mechanisms are not consistent, users might need to use both mechanisms to opt-out. Summary results for each NAI member can be found in Table 3.

We also checked opt-out cookies to be sure that they persist for five years, in keeping with the DAA<sup>10</sup> and NAI [28] requirements. Since multiple opt-out cookies can be set for a single domain, we considered a domain to be compliant if at least one of the opt-out cookies had a duration of at least five years.

<sup>10</sup> <http://www.aboutads.info/how-interest-based-ads-work/what-are-opt-out-cookies-and-how-do-they-remember-opt-out-preferences>

Three domains: `adsonar.com`, `advertising.com`, and `invitemedia.com`, were not compliant when their cookies were set with the NAI mechanism in February. Only `invitemedia.com` was non-compliant when using the DAA mechanism. This shows another dimension of inconsistency between the two mechanisms. In March, `invitemedia.com` became compliant with both mechanisms, but `adsonar.com` and `advertising.com` were still not compliant.

It is noteworthy that when we attempted to opt-out of all NAI members at once using the NAI opt-out mechanism, the cookie for Advertising.com was set to expire in two years. However, when we used the same mechanism to opt-out of only Advertising.com, the cookie was set to expire in 88 years. On further investigation, it appears that opting out of Tacoda sets the shorter opt-out cookie for Advertising.com. Both `advertising.com` and Tacoda are owned by AOL, so we suspect that when both are selected in the NAI opt-out mechanism, the 88-year cookie set when Advertising.com is selected becomes overwritten by the shorter cookie set when Tacoda is selected.

The DAA and NAI opt-out mechanisms do not function in the Apple Safari browser with default settings. Safari blocks third-party cookies from being set; a cookie for a given domain can be set only when a user navigates there. A user who navigates to an advertising network website may subsequently be tracked by that network across other websites and is unable to use either mechanism to opt out of this tracking. To confirm, we navigated to various websites with Safari 5.0.3 and then attempted to use the NAI opt-out mechanism. Several advertising networks had placed tracking cookies on our computer, but we were unable to opt-out from them using the mechanism.

#### 5.4 Definitions of Opting Out

The DAA requires that its members provide “users of Web sites at which data is collected and used for Online Behavioral Advertising purposes the ability to choose whether data is collected and used for such purposes.” The DAA website says that opting out will not stop data collection, but will stop delivery of ads based on preferences.<sup>11</sup> Consistent with the DAA’s definition, the NAI defines opting out as follows [27]:

Opt out of OBA means that a consumer is provided an opportunity to exercise a choice to disallow OBA with respect to a particular browser. If a consumer elects to opt out of non-PII OBA, collection of non-PII data regarding that consumer’s browser may only continue for non-OBA purposes, such as ad delivery & reporting.

Still, 58 of 66 NAI members provided their own definitions of opt-out, sometimes going beyond the NAI and DAA requirements.<sup>12</sup> For example, AdBrite states that it will delete prior data when a user opts out. Atlas indicates it will

<sup>11</sup> <http://www.aboutads.info/opt-out>

<sup>12</sup> The members that did not define opting out are Aggregate Knowledge, Burst Media, DataXu, Dotomi, MediaMath, XGraph, [x+1], and Yahoo!

stop using collected data. Casale Media states that it replaces its usual advertisements with public service announcements. The Fox Audience Network says it will continue collecting data, but will not merge pre- and post-opt-out data.

Of those 58 websites that define opting out, 27 indicate collecting less or no data or no longer tracking the user, and 22 of those 27 indicate collecting no data or not tracking the user. The other 31 members that define opting out indicate only that opting out would entail not seeing targeted ads, which is consistent with the minimum requirements of the DAA and NAI. Four of these members explicitly state that information collection would continue. These findings are detailed in Table 5.

## 6 Discussion

### 6.1 Limitations

This paper checks member compliance with the DAA and NAI notice and choice principles through inspection of websites, advertisements, and cookies. However, our approach has some limitations.

We may have overlooked some notices that appear outside a site’s privacy policy. Neither the DAA nor the NAI explicitly require their notices to be placed in member privacy policies. However, the DAA principles indicate that notice should be “clear, meaningful, and prominent” [7]. The NAI Principles state that notice is to be given “clearly and conspicuously” [27]. Therefore, when we are unable to find a required notice on a member privacy policy or linked websites, the site would still be in compliance if it is present on some other prominent page of the website. Nonetheless, a website that provides a notice but doesn’t link to it from its privacy policy is arguably not communicating clearly and conspicuously with its users.

We were unable to make a reliable determination about which observed advertisements were behavioral and which third-party cookies were associated with OBA. We narrowed the scope of our investigation by focussing only on third-party cookies placed by NAI member companies and by eliminating ads that we judged to be contextual. However, it is likely that some of the ads and cookies we eliminated are actually subject to OBA requirements. On the other hand, some of the ads and cookies we included may not actually meet the definition of OBA. Nonetheless, we believe our dataset provides a good ballpark estimate of enhanced notice compliance on the most popular websites, and we provide detailed information about our methodology and findings to enable readers to determine the basis for our compliance estimates.

### 6.2 Public Policy Implications

The results of our study raise a number of public policy concerns. The DAA published its principles about 20 months ago in July 2009 and officially launched its self-regulatory program over five months ago on October 4, 2010 [6]. Although

we have observed an increasing rate of compliance in recent weeks, overall compliance has been slow. We observe infrequent compliance with the “enhanced notice” requirements, and only one of the 66 NAI members indicates DAA membership despite being required to do so.

Beyond shortcomings in notice requirements, the DAA and NAI opt-out mechanisms contain errors. Opt-out cookies fail to be set for some members. The opt-out cookies for others differ between the two mechanisms, and some have durations shorter than the required five years. Even if the opt-out mechanisms did work flawlessly, they do not adapt to changing membership. In the past three months, six new members have joined the NAI; a user who has opted out of all NAI members three months ago would not be opted-out of six members today. This problem is highlighted by the fact that NAI membership jumped from 34 in January 2010 to 66 in February 2011 [30].

Given the focus on third-party tracking, users are unable to opt-out of tracking by websites they are currently visiting (e.g., companies that offer both first-party content and third-party behavioral advertising services). This may come as a surprise to consumers who think they have opted out of tracking by a particular company but may not realize it applies only when that company is acting as a third-party behavioral advertising company. The DAA and NAI give users no way to avoid being tracked on the websites of NAI members. The narrow definition of OBA proposed by the FTC and adopted by the DAA and NAI may be insufficient for addressing privacy concerns.

We also observe that two NAI members impose limitations and demands on any user who visits their web sites, which is necessary in order to read their privacy policies. Undertone’s privacy policy states that “by using the Undertone Site Network, this website or sharing information with us, you give your agreement to this Privacy Policy.”<sup>13</sup> Undertone’s privacy policy also stipulates limitations of liability. Valueclick Media’s privacy policy states, “Please read this policy carefully since by visiting this website (“Website”) and/or sharing information with us, you agree to be bound by this Privacy Policy.”<sup>14</sup> Valueclick imposes requirements on its users, including how privacy disputes will be handled. In both of these cases, a user attempting to learn about a company’s behavioral advertising practices and read the notices that the DAA and NAI require will be struck with limitations on his or her rights.

Finally, we’ve seen that a number of NAI members provide their own definitions of opting out, going beyond the minimum bar set by the NAI requirements. This is positive from a privacy perspective. A common vocabulary for these opt-out variations could be useful for helping consumers understand what will happen when they opt-out.

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<sup>13</sup> <http://www.undertone.com/privacy/>

<sup>14</sup> <http://www.valueclick.com/privacy>

## 7 Acknowledgements

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## A Appendix

**Table 3.** Analysis of enhanced notice and opt-out cookies for NAI members. Enhanced notice data was derived by examining advertisements on the Quantcast top 100 U.S. websites. Opt-out mechanisms were tested in February, March, and August of 2011.

Name	Pages where member collects data while non-contextual ad is shown (Spr. / Sum.)	Pages where enhanced notice was found (Spr. / Sum.)	Number cookies set by DAA opt-out (Feb. / Mar. / Aug.)	Number cookies set by NAI opt-out (Feb. / Mar. / Aug.)	Do its DAA and NAI cookies match? (Feb. / Mar. / Aug.)
[x+1]			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
24/7 Real Media	0 / 2	0 / 0	1 / 1 / 1	1 / 1 / 4	Yes / Yes / No
33Across			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Adara Media			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes

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Name	Pages where member collects data while non-contextual ads are shown (Spr. / Sum.)	Pages where enhanced notice was found (Spr. / Sum.)	Number cookies set by DAA opt-out (Feb. / Mar. / Aug.)	Number cookies set by NAI opt-out (Feb. / Mar. / Aug.)	Do its DAA and NAI cookies match? (Feb. / Mar. / Aug.)
AdBrite			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
AdChemey			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Adconion Media Group	0 / 5	0 / 5	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
AddThis	- / 19	- / 8	- / - / 1	- / - / 1	- / - / Yes
Adify	1 / 3	0 / 0	1 / 1 / 1	1 / 1 / 1	Yes / Yes / No
AdMeld	4 / 26	3 / 13	0 / 0 / 1	1 / 1 / 1	No / No / Yes
Aggregate Knowledge			1 / 1 / 2	1 / 1 / 2	Yes / Yes / Yes
Akamai Technologies			2 / 2 / 3	2 / 2 / 3	Yes / Yes / Yes
AOL Advertising	57 / 47	20 / 24	4 / 4 / 7	6 / 7 / 7	No / No / Yes
Aperature			- / - / 1	- / - / 1	- / - / Yes
Atlas	0 / 5	0 / 5	1 / 1 / 0	2 / 2 / 1	No / No / No
AudienceScience	39 / 48	11 / 25	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Batanga			0 / 0 / 0	0 / 0 / 0	NA / NA / NA
Bizo			4 / 4 / 5	4 / 4 / 5	Yes / Yes / Yes
BlueKai	13 / 17	11 / 11	2 / 2 / 1	2 / 2 / 1	No / No / Yes
BrightRoll			- / - / 0	- / - / 1	- / - / No
Brilig			1 / 0 / 1	1 / 1 / 1	Yes / No / Yes
Burst Media			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Buysight			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Casale Media	21 / 5	3 / 1	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Cognitive Match			- / - / 0	- / - / 4	- / - / No
Collective	20 / 9	9 / 8	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Criteo			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Cross Pixel Media			- / - / 1	- / - / 1	- / - / Yes
DataLogix	1 / 0	0 / 0	2 / 2 / 2	2 / 2 / 2	Yes / Yes / Yes
DataXu			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Datonic			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Dedicated Networks	0 / 1	0 / 1	0 / 1 / 1	1 / 1 / 1	No / Yes / Yes
Dotomi	6 / 0	3 / 0	2 / 2 / 1	2 / 2 / 1	Yes / Yes / Yes
Epic Marketplace	2 / 0	2 / 0	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
eXelate			2 / 2 / 2	2 / 2 / 2	Yes / Yes / No
FetchBack			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes

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Name	Pages where member collects data while non-contextual ads are shown (Spr. / Sum.)	Pages where enhanced notice was found (Spr. / Sum.)	Number cookies set by DAA opt-out (Feb. / Mar. / Apr.)	Number cookies set by NAI opt-out (Feb. / Mar. / Aug.)	Do its DAA and NAI cookies match? (Feb. / Mar. / Aug.)
Glam Media			0 / 1 / 1	1 / 1 / 1	No / Yes / Yes
Google I-Behavior	127 / 148	43 / 74	2 / 1 / 6	1 / 2 / 1	No / No / No
interCLICK	3 / 11	3 / 5	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Invite Media			11 / 11 / 2	11 / 11 / 11	Yes / Yes / No
Lotame	4 / 1	0 / 0	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
MAGNETIC			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
MaxPoint Interactive			- / - / 0	- / - / 1	- / - / No
Media Innovation Group	- / 1	- / 1	- / - / 0	- / - / 3	- / - / No
Media6Degrees	7 / 3	1 / 3	1 / 1 / 1	1 / 1 / 1	Yes / No / No
MediaMath			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
MediaMind	- / 4	- / 4	- / - / 0	- / - / 1	- / - / No
Mediaplex			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Microsoft	4 / 4	4 / 4	4 / 4 / 1	4 / 4 / 4	Yes / Yes / No
Mindset Media			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Netmining			1 / 1 / 1	1 / 1 / 0	Yes / Yes / No
OwnerIQ			0 / 0 / 1	1 / 1 / 1	No / No / Yes
Pulse360	- / 4	- / 4	- / - / 1	- / - / 1	- / - / Yes
Quantcast	101 / 89	30 / 38	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
RadiumOne			- / - / 1	- / - / 1	- / - / Yes
Red Aril			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Rich Relevance			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Rocket Fuel			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
SpecificMEDIA	5 / 0	5 / 0	3 / 3 / 3	3 / 3 / 3	Yes / Yes / Yes
TARGUSinfo			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
The Fox Audience Network	6 / 5	3 / 3	3 / 3 / 5	3 / 3 / 3	Yes / Yes / No
TidalTV			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Tribal Fusion	13 / 12	4 / 2	0 / 0 / 1	1 / 1 / 1	No / No / Yes
TruEffect			- / - / 0	- / - / 1	- / - / No
Tumri			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Turn	0 / 5	0 / 5	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Undertone Networks			2 / 2 / 2	2 / 2 / 2	Yes / Yes / Yes

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Name	Pages where member collects data while non-contextual ads are shown (Spr. / Sum.)	Pages where enhanced notice was found (Spr. / Sum.)	Number cookies set by DAA opt-out (Feb. / Mar. / Aug.)	Number cookies set by NAI opt-out (Feb. / Mar. / Aug.)	Do its DAA and NAI cookies match? (Feb. / Mar. / Aug.)
ValueClick Media	0 / 1	0 / 1	2 / 2 / 1	2 / 2 / 2	Yes / Yes / No
Vibrant In-Text Solutions	2 / 4	1 / 2	1 / 1 / 1	1 / 1 / 1	Yes / Yes / No
Wall Street on Demand			1 / 1 / 2	1 / 1 / 2	Yes / Yes / No
XGraph	3 / 0	1 / 0	1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes
Yahoo!	28 / 21	8 / 13	2 / 2 / 3	2 / 2 / 5	No / No / No
YuMe			1 / 1 / 1	1 / 1 / 1	Yes / Yes / Yes

**Table 4.** NAI Member Privacy notice compliance for February 2011 and August 2011. A “No” indicates that notice was not found in the member’s privacy policy. If the value is the same for February and August, it is listed once. If there is a change between February and August, it is listed as FebruaryValue - AugustValue. Websites marked with \* are only listed as NAI members for August.

Name	Types of data collected	How data will be used	Adherence to DAA Principles	How long data will be retained	Note
[x+1]	Yes	Yes	No	No <sup>1</sup>	
24/7 Real Media	Yes	Yes	No-Yes	Yes	
33Across	Yes	Yes	No	Yes	
Adara Media	Yes	Yes	No	Yes	
AdBrite	Yes	Yes	No	Yes	
AdChemy	Yes	Yes	No	Yes	
Adconion Media Group	Yes	Yes	No	Yes	
*AddThis	Yes	Yes	Yes	Yes	
Adify	Yes	Yes	No	Yes	
AdMeld	Yes	Yes	No	Yes	
Aggregate Knowledge	Yes	Yes	No	Yes	
Akamai Technologies	Yes	Yes	No	Yes	
AOL Advertising	Yes	Yes	No-Yes	Yes	
*Aperature	Yes	Yes	No	No <sup>1</sup>	
Atlas	Yes	Yes	No	Yes	
AudienceScience	Yes	Yes	Yes	Yes	
Batanga	Yes	Yes	No	Yes	
Bizo <sup>6</sup>	Yes	Yes	No-Yes	Yes <sup>1</sup>	
BlueKai	Yes	Yes	No-Yes	Yes	
*BrightRoll	Yes	Yes	No	No	
Brilig	Yes	Yes	No	Yes	
Burst Media	Yes	Yes	No	Yes	
Buysight	Yes	Yes	No	Yes	
Casale Media	Yes	Yes	No-Yes	No <sup>2</sup>	
*Cognitive Match	Yes	Yes	No	Yes	
Collective	Yes	Yes	No-Yes	Yes	
Criteo	Yes	Yes	No	Yes	
*Cross Pixel Media	Yes	Yes	No	Yes	

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Name	Types of data collected	How data will be used	Adherence to DAA principles	How long data will be retained	Note
DataLogix	Yes	Yes	No-Yes	<b>No</b> <sup>3</sup>	
Datonics	Yes	Yes	<b>No</b>	Yes	
DataXu	Yes	Yes	No-Yes	Yes	
Dedicated Networks	Yes	Yes	<b>No</b>	<b>No</b> <sup>1</sup>	
Dotomi	Yes	Yes	<b>No</b>	Yes	
Epic Marketplace	Yes	Yes	<b>No</b>	Yes	
eXelate	Yes	Yes	<b>No</b>	Yes	
FetchBack	Yes	Yes	<b>No</b>	Yes	
Glam Media	Yes	Yes	<b>No</b>	Yes	
Google	Yes	Yes	<b>No</b>	<b>No</b>	
I-Behavior	Yes	Yes	<b>No</b>	Yes	
interCLICK	Yes	Yes	<b>No</b>	Yes	
Invite Media	Yes	Yes	<b>No</b>	Yes	
Lotame	Yes	Yes	<b>No</b>	Yes	
MAGNETIC	Yes	Yes	<b>No</b>	Yes	
*MaxPoint Interactive	Yes	Yes	<b>No</b>	Yes	
*Media Innovation Group	Yes	Yes	Yes	Yes	
Media6Degrees	Yes	Yes	<b>No</b>	Yes	
MediaMath	Yes	Yes	No-Yes	Yes	
*MediaMind Technologies	Yes	Yes	<b>No</b>	Yes	
Mediaplex	Yes	Yes	<b>No</b>	Yes	
Microsoft	Yes	Yes	<b>No</b>	<b>No</b> <sup>1,4</sup>	
Mindset Media	Yes	Yes	<b>No</b>	Yes	
Netmining	Yes	Yes	<b>No</b>	Yes	
OwnerIQ	Yes	Yes	<b>No</b>	<b>No</b> <sup>1</sup>	
*Pulse360	Yes	Yes	<b>No</b>	Yes	
Quantcast	Yes	Yes	No-Yes	Yes	
*RadiumOne	Yes	Yes	<b>No</b>	Yes	
Red Aril	Yes	Yes	<b>No</b>	Yes	
richrelevance	Yes	Yes	No-Yes	Yes	
Rocket Fuel	Yes	Yes	No-Yes	Yes	
SpecificMEDIA	Yes	Yes	<b>No</b>	Yes	
TARGUSinfo	Yes	Yes	<b>No</b>	<b>No</b> <sup>1</sup>	
The Fox Audience Network	No <sup>5</sup> -Yes	Yes	No-Yes	Yes- <b>No</b>	
TidalTV	Yes	Yes	<b>No</b>	Yes	
Tribal Fusion	Yes	Yes	<b>No</b>	Yes	
*TruEffect	Yes	Yes	<b>No</b>	<b>No</b>	
Tumri	Yes	Yes	<b>No</b>	Yes	
Turn	Yes	Yes	<b>No</b>	Yes	
Undertone Networks	Yes	Yes	No-Yes	Yes	
ValueClick Media	Yes	Yes	<b>No</b>	Yes	
Vibrant In-Text Solutions	Yes	Yes	<b>No</b>	Yes	
Wall Street on Demand	Yes	Yes	<b>No</b>	Yes	
XGraph	Yes	Yes	<b>No</b>	Yes	
Yahoo!	Yes	Yes	No-Yes	<b>No</b> <sup>2</sup>	
YuMe	Yes	Yes	<b>No</b>	Yes	

1 Notice only mentions cookie expiration.

2 Notice only mentions log file retention.

3 Notice only mentions cookie expiration and log file retention.

4 Retention information found in a blog post, not in prominent location.

5 Notice explains that "non-personally identifiable information obtained from cookies, web beacons, and/or similar monitoring technologies" is collected, but the types of data are not specified.

6 We were notified that Bizo's privacy policy became compliant with the data retention requirement on March 16, 2011.

**Table 2.** The top 100 websites for the U.S. audience as ranked by Quantcast [31] and the level of compliance with the enhanced notice requirement that we observed. Only websites on which we observed non-contextual ads are listed. We are including the observations from the Spring and Summer of 2011. Note that mybloglog.com (55 in the top 100) is excluded from this table. It did not show non-contextual ads in the Spring, and in the Summer, it pointed to yahoo.com. Some websites appear to have made an effort toward compliance, without being entirely compliant. A website marked “Trying” is making an attempt for all of their ads to be compliant by placing a link at the bottom of the web page, but that page is not entirely compliant.

Rank	Website	Compliance, Spring	Compliance, Summer	Enhanced Notice Observed
3	yahoo.com	Fully	Fully	Ad. Opt. Icon, Power I, Link at bottom
4	youtube.com	N/A	Fully	Advertising Option Icon
5	msn.com	Fully	Fully	Ad. Opt. Icon, Power I, Link at bottom
12	aol.com	No	Fully	Ad. Opt. Icon, Link at bottom
14	answers.com	Some	No	Advertising Option Icon
17	ask.com	Some	Some	Advertising Option Icon
18	ehow.com	No	Fully	Ad. Opt. Icon, Link at bottom
20	about.com	No	Fully	Ad. Opt. Icon, Link at bottom
21	myspace.com	Some	Some	Power I, Ad. Opt. Icon
22	weather.com	No	Some	Advertising Option Icon
23	mapquest.com	Some	No	Advertising Option Icon
26	photobucket.com	No	No	-
27	reference.com	Some	Some	Power I, Ad. Opt. Icon
31	go.com	N/A	Some	Link at bottom
32	huffingtonpost.com	No	No	-
34	break.com	No	Fully	Link at bottom
35	hulu.com	N/A	No	-
36	comcast.net	N/A	Fully	Link near ads
38	imdb.com	Some	None	Advertising Option Icon
39	monster.com	Some	Some	Advertising Option Icon
41	webmd.com	N/A	Fully	Advertising Option Icon
42	pandora.com	Some	Some	Advertising Option Icon
45	whitepages.com	No	Fully	Link at bottom
46	associatedcontent.com	Fully	Fully	Ad. Opt. Icon, Power I, Link at bottom
47	cnn.com	Fully	Fully	Ad. Opt. Icon, Link at bottom
48	flickr.com	Fully	N/A	Link near ads
50	manta.com	Fully	Fully	Advertising Option Icon
54	hubpages.com	N/A	Fully	Power I, Ad. Opt. Icon
56	filmanex.com	No	No	-
57	chinaontv.com	No	N/A	-
58	digg.com	No	Some	Advertising Option Icon
59	cnet.com	Fully	Fully	Link near ads
60	yellowpages.com	Fully	Fully	Power I, Link at bottom
62	washingtonpost.com	Fully	Fully	Ad. Opt. Icon, Link at bottom
64	nytimes.com	Trying	Fully	Ad. Opt. Icon, Link at bottom
66	tripadvisor.com	No	N/A	-
67	legacy.com	Some	Some	Advertising Option Icon
68	evite.com	No	Some	Advertising Option Icon
69	bbc.co.uk	No	Fully	Link at bottom
71	people.com	No	Fully	Link at bottom
72	chacha.com	No	Some	Advertising Option Icon
73	tmz.com	No	Some	Advertising Option Icon
75	drudgereport.com	No	No	-
77	dailymotion.com	N/A	Some	Link near ads
79	accuweather.com	Trying	Fully	Ad. Opt. Icon, Power I, Link at bottom
80	suite101.com	Some	Some	Advertising Option Icon
81	mtv.com	Fully	Fully	Link at bottom
83	yelp.com	No	Some	Advertising Option Icon
86	examiner.com	Some	No	Power I
87	wikia.com	Some	Fully	Advertising Option Icon
89	squidoo.com	Some	Some	Power I, Ad. Opt. Icon
90	merriam-webster.com	Some	Some	Advertising Option Icon
93	weatherbug.com	No	No	-
94	bizrate.com	No	No	-
96	wunderground.com	No	Some	Advertising Option Icon
99	twitpic.com	Some	Fully	Advertising Option Icon
100	candystand.com	No	Fully	Advertising Option Icon

**Table 5.** Categorized definitions of opting out based on NAI members' privacy policies. Only members that defined opting out are included in this table.

The update version of this table is in Table5.xls in the data directory of SVN.