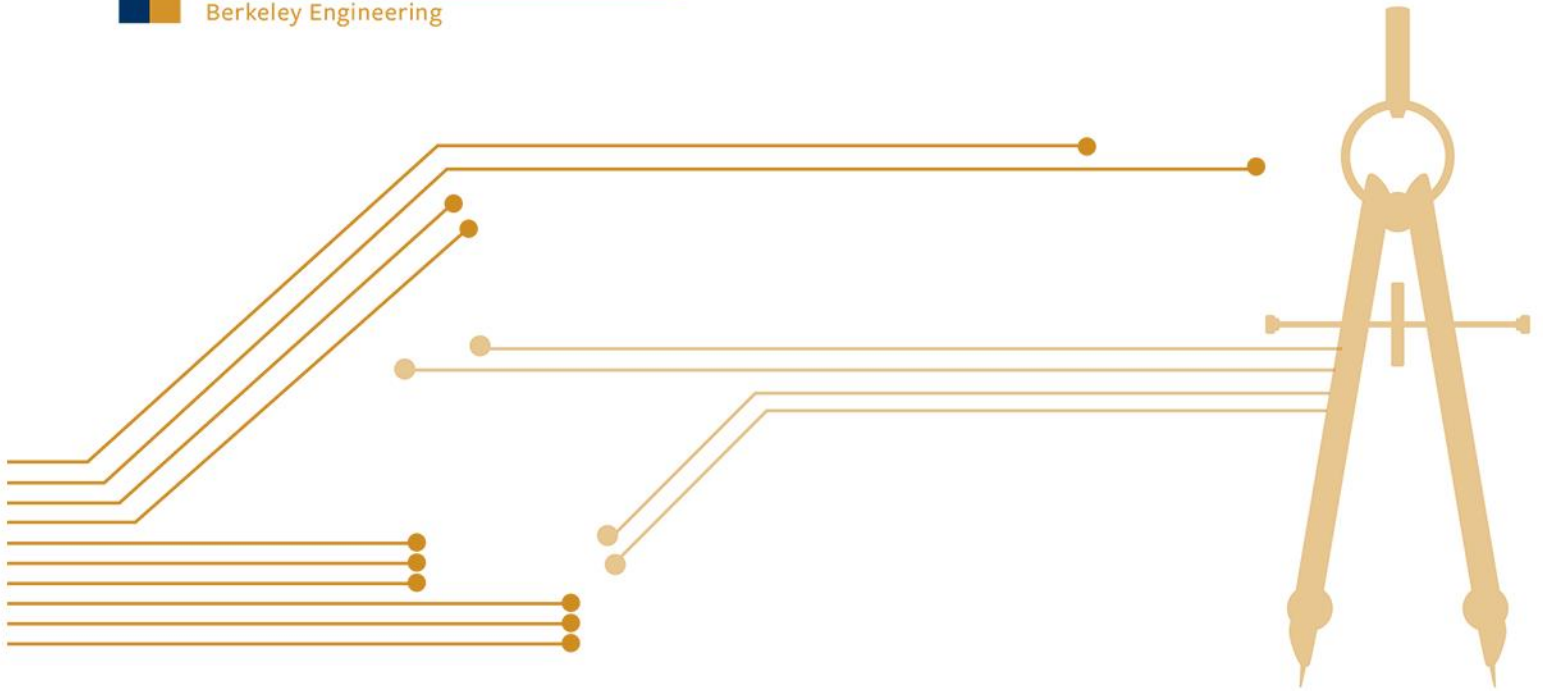




Pantas and Ting
Sutardja Center
for Entrepreneurship & Technology

Berkeley Engineering



Leveraging Adverts in the Coming Autonomous Car Eco-system

Authors: Ahmed Azab, Debashis Chatterjee, Clay Hollingsworth, Sameer Nanavati, Chris Peri

This work was created in an open classroom environment as part of a program within the Sutardja Center for Entrepreneurship & Technology and led by Prof. Ikhlaq Sidhu at UC Berkeley. There should be no proprietary information contained in this paper. No information contained in this paper is intended to affect or influence public relations with any firm affiliated with any of the authors. The views represented are those of the authors alone and do not reflect those of the University of California Berkeley.



Table of Contents

Overview	3
Industry landscape	4
Transportation Network Companies (TNC)	4
Uber and its Competitors.....	6
Ad networks	7
Dominant Players in Ad Networking.....	8
Advertising technologies for the future.....	9
Content streaming companies	10
Evolution of content streaming.....	10
Advertisements within streaming content.....	11
Summary	11
Disruption in Industry	12
Disruption in Current Landscape	12
Rideshare.....	12
Ad Networks.....	12
Streaming Content Providers.....	13
Timeline	13
New Ecosystem	14
Assets Required	14
Analysis of Existing Ad Networks	15
Intellectual Property and Regulations	19
Legal challenges from other market players	19
Regulatory Challenges	19
Legal Challenges from Patent Infringement	20
Fundamental Patents.....	20
Broad Patents on Vehicle Advertisement.....	20
Patents on Related Technologies.....	21
Conclusion on Legal and Regulatory Landscape	22
Opportunities from the Disruption	22

Table of figures

Figure 1 Responses to “What are the top two reasons you used [X service] for this trip?”	5
Figure 2 TNCs in different parts of the world.....	7
Figure 3 Online ad publishing system.....	8
Figure 4 Dynamic ad insertion	10
Figure 5 Autonomous Car Levels.....	13
Figure 6 US DOOH Ad Spending.....	16
Figure 7 Location Based Ad Spend.....	17
Figure 8 Comparison of Ad Networks.....	23
Figure 9 Possible Conglomeration which addresses Advert based Personal Transport.....	24

Table 1 Summary of Expertise of the Big Five.....	12
Table 2 Ad Networks and their Capabilities.....	18
Table 3 Ad Networks Capability Scores	18



Overview

In this report we propose a world where rideshares are free, or in some cases, heavily subsidized through the use of advertisements.

Today ride sharing is a taxicab replacement model. This market is \$100 billion a year globally. However, with the advent of autonomous cars, the market will morph into a \$10 trillion market for personal transport.¹ Fleets of autonomous cars will drive down the cost of ridership to the point where people will opt out of car ownership. On demand services that combine public (buses, trains) and personal transports networks to cover the “last-mile” will extend the reach of this phenomenon beyond the taxicab replacement model we have today.

The report outlines the current industry landscape and who the major players are. We discuss the coming disruptions in the space and offer a timeline of when they will take place. We then study the incumbent big companies in this space today and identify gaps in their arsenal to address the upcoming shifts. We hone in on the role of the Advertisement Network and study their capabilities to address the personal transport market. And finally we propose a possible path to combat the incumbents in this space through a combination of partnerships and acquisitions.

¹ The Economist, “Uberworld”, September 3, 2016

Industry landscape

This part of the report introduces the industry landscape for the “free rides through ads” business. There are three main components in this industry landscape; the transportation network, the ad network and the content streaming companies. By completing the link between the merchants who want to advertise the products and the viewers who are watching the videos, these three components working together complete the ecosystem.

The business will be driven by advertisement money. Merchants will steer part of their advertising budget to the vehicular ads category of advertising. Ad network companies will work with transportation network companies to get these ads displayed in cars. The ads will be dynamically inserted within streaming content. Costs of advertising will be determined by when the ad is shown – at the beginning (pre-roll), in the middle (mid-roll) or at the end (end-roll). The following sections provide additional details on these three important components of the ecosystem.

Transportation Network Companies (TNC)

Though Americans have traditionally loved the freedom of driving their own cars to any destination, a variety of market dynamics resulted in a new service model for transportation. This new service is initiated by a passenger hailing a car using a smartphone app. The car that shows up is, in most cases, not a cab or a taxi belonging to a fleet owned by a businessman, but a personal vehicle driven by the owner.

The radical new business model provides income opportunities to car owners. Anyone who owns a car and likes to drive can be a driver. The passenger’s convenience consists of being able to call and pay from their smartphone, and to be able to ride on a vehicle of better quality such as a luxury sedan.

Often addressed in a variety of names such as ride-sharing, ride-sourcing and ride-splitting, today the most accepted name for this industry is transportation network companies (TNC). Extrapolating data from different sources, one can expect that at least a billion TNC rides will be used in 2016 in the US alone. The table below shows some of the factors that the passengers considered for choosing a TNC for their ride.

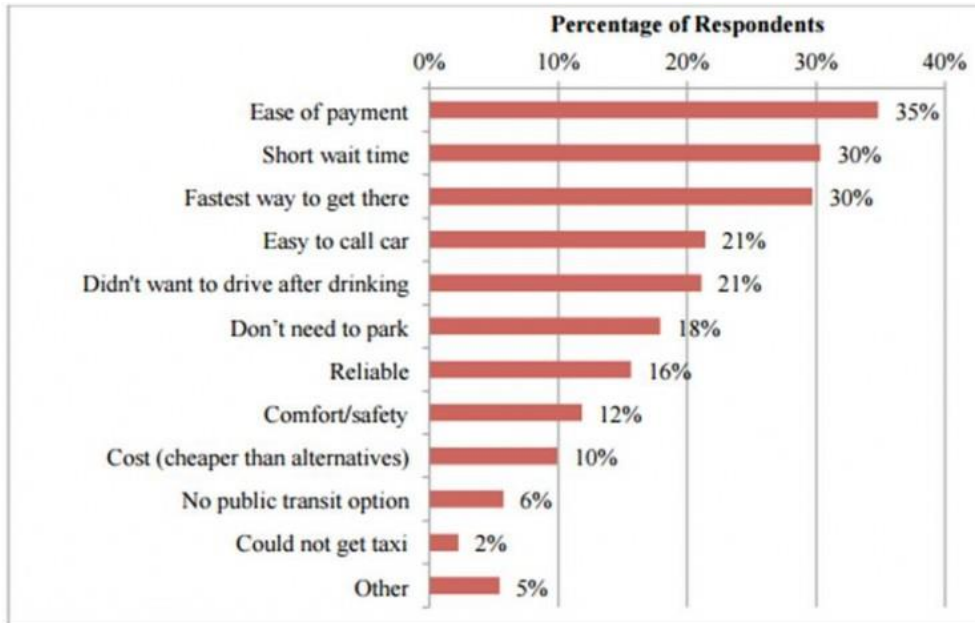


Figure 1 Responses to "What are the top two reasons you used [X service] for this trip?"²

² http://www.its.dot.gov/itspac/Dec2014/RidesourcingWhitePaper_Nov2014.pdf

Uber and its Competitors

Uber is by far the most significant company in this segment. From data collected in early 2016, it was found that 169 million trips were booked through Uber worldwide in March 2016, and 50 millions of those were in the U.S. Uber's closest competitor, Lyft, did only 11 million U.S. rides the same month.³

Along with being successful commercially, Uber is continuously exploring ways to attract new users by offering an improved experience. Recently they introduced partnerships with Pandora and Spotify so that the riders can enjoy their favorite music while riding Uber.⁴ They have also moved quickly to utilizing autonomous cars, announcing driverless Uber cars in Pittsburgh in late August 2016.⁵

The staggering success of Uber resulted in the formation of a number of copycat businesses throughout the world. This includes Lyft in US, Ola in India, Didi Chuxing (previously Didi Kuaidi) in China and Grabtaxi in Singapore. Many of these companies are quite successful, and were able to thwart Uber on their home turf. As an example, Uber has been spending close to a billion dollar in China every year but hasn't been able to overcome the dominance of Didi. To make matters worse, Lyft, Didi, Ola and Grab have formed a global alliance⁶ where the reach of one company's mobile app extends seamlessly to other countries; for instance, a Didi user from China travelling to US will be able to summon Lyft cars from the Didi mobile app.

Another significant competitor could be Tesla, the undisputed leader in electric cars segment. In a recently released "master plan 2", Elon Musk, the Tesla CEO, made it very clear that ridesharing will be an important part of Tesla's business going forward.⁷ Google and Apple are both working on driverless cars but haven't disclosed any plans of going into ridesharing. In particular, Apple's autonomous car project appears to be going through a reset right now.⁸

³ <https://www.bloomberg.com/news/articles/2016-04-14/lyft-is-gaining-on-uber-as-it-spends-big-for-growth>

⁴ <https://newsroom.uber.com/ridermusic/>

⁵ <http://www.bloomberg.com/news/features/2016-08-18/uber-s-first-self-driving-fleet-arrives-in-pittsburgh-this-month-is06r7on>

⁶ <http://www.businessinsider.com/lyft-didi-ola-grab-anti-uber-alliance-launches-2016-4>

⁷ <https://electrek.co/2016/07/20/elon-musk-tesla-master-plan-part-2/>

⁸ <http://qz.com/811199/apple-aapl-is-scaling-back-its-autonomous-car-ambitions-and-focusing-on-creating-self-driving-software/>

THE GREAT GAME

Ride-hailing apps are scrambling to grab market share as demographics shift and smartphones proliferate. Here's where Uber already dominates—and where Uber is the Lyft to someone else's Uber.

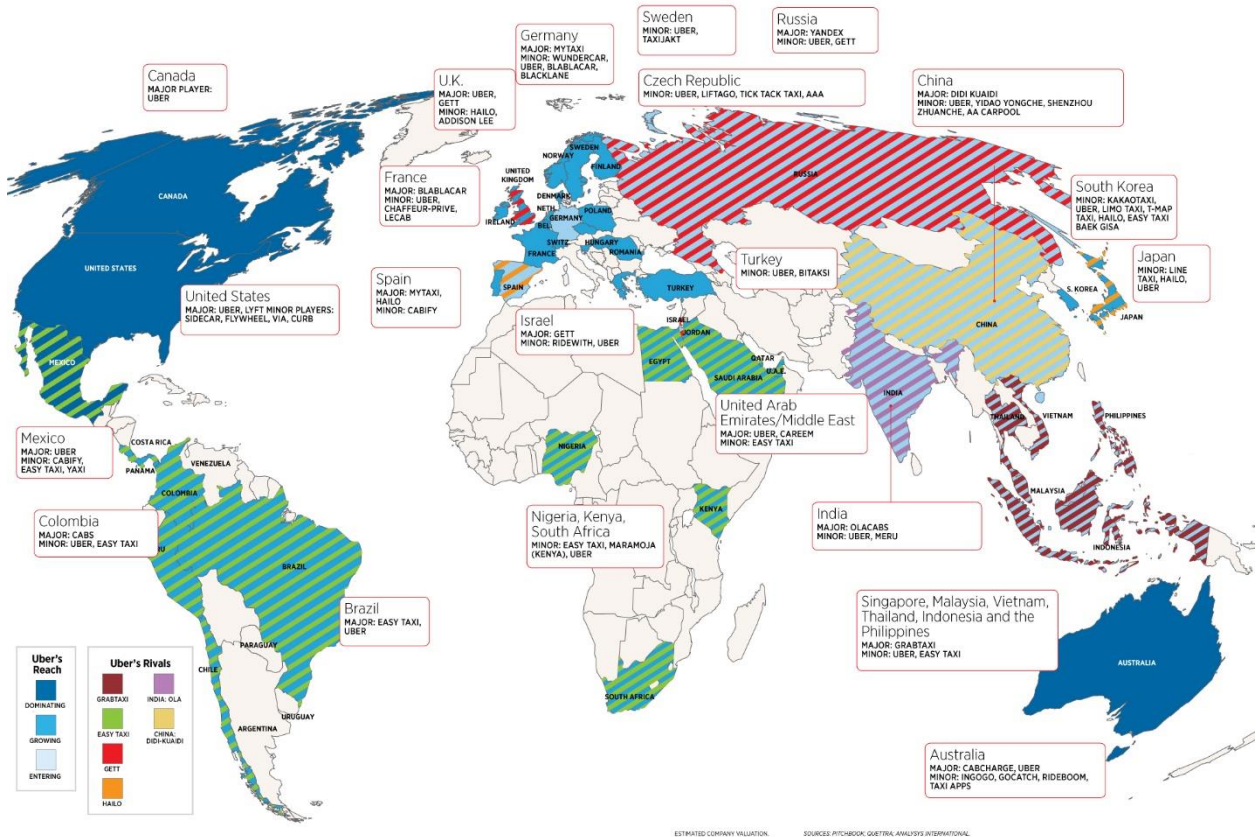


Figure 2 TNCs in different parts of the world⁹

Ad networks

Ad networks in this context are mainly the non-print ads or computer-based ads, often called online or digital ads. These ad networks act as the channel connecting the companies that want to advertise to the websites that attract millions of visitors and can host advertisements. Since advertising is a key part of the path to free rides, it is important to understand the big players in this field.

At a very high level, this is how online ads work.¹⁰

1. When a computer user visits a certain website, the browser provides to the website a data profile of the user that can provide the user's age, gender, location

⁹ <https://www.bloomberg.com/news/articles/2016-04-14/lyft-is-gaining-on-uber-as-it-spends-big-for-growth>

¹⁰ <http://gizmodo.com/how-online-ads-work-1530627881>

and a list of sites they have recently visited. This is the starting data that the website uses to decide which ad or ads to show.

2. This part of profile matching is usually handled by the website's ad network, and Doubleclick is one of the biggest ad networks today. The ad network will check to see if the profile matches up with any of the presold inventory of ads.
3. If the profile doesn't fit, then a request is sent to an ad exchange that might be operated by anybody from Adobe to Facebook. These exchanges might already have data on the user which it will use to strengthen the profile information in order to serve more relevant ads.
4. This ad information is sent to an online ad auction block where different third parties try to match their ads with the profile for the right price. Within a few milliseconds, the impression is sold to the highest bidder, and the winning ad is sent to the web browser.

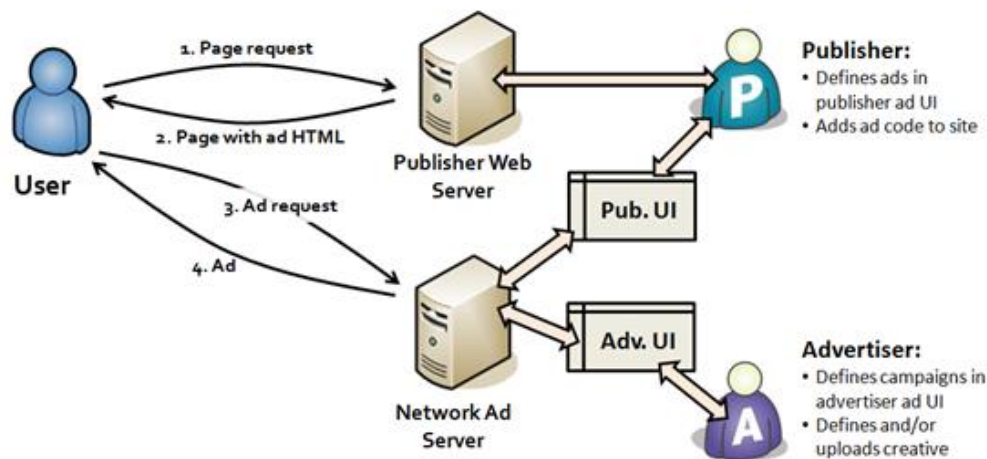


Figure 3 Online ad publishing system

Dominant Players in Ad Networking

Google Adwords is Google's own online advertising service. The technology is based partly on cookies and keywords predefined by the advertisers. The Adwords system enables advertisers to compete for advertising space using the mechanism described in the previous sections. When a particular ad wins the bid, the web pages from Google and its partner websites are designed to allow selection and displaying of this winning ad. The advertisers pay whenever users go to a different website to get more information on the ad displayed, and partner websites receive a portion of the proceeds. According to the Adwords website, their display ads appear on over two million websites and in over 650,000 apps¹¹.

¹¹ <https://adwords.google.com/home/display-ads/?subid=us-en-or-ot-aw-c-dyn-en.wikipedia.org!o2>

DoubleClick is also owned by Google, but unlike Adwords, Doubleclick was a separate and independent company that was acquired by Google in 2005 for \$3.1 billion. Online publishers use Doubleclick's technology to control what type of ads will be shown, how often they are shown, and how long will they be shown for. These decisions are made based on the setting of Doubleclick cookies that tell publishers what sections of their sites a user is looking at. As an example, someone looking at the sports page will get ads on game tickets, not on clothes and jewelry. Doubleclick also sets a special cookie every time an ad is clicked and that's how they pioneered the pay-per-click (PPC) model of ads.

AdMob is Google's advertising platform for mobile apps. Advertisers pay Google to use AdMob as a platform for promoting their app within other existing mobile apps. Simply by offering other apps to advertise within their app, an app developer can collect AdMob revenue. Google is able to offer this revenue from the fee it charges for using AdMob.

Though the merchants are paying a lot of money to advertise their products online using the channels described above, none of these channels are particularly useful in securing a product purchase through advertising. That's why today the merchants are interested in increasing foot traffic to their brick-and-mortar stores using a technology called location-based advertising (LBA), whose main premise is to serve ads relevant for the current location. A hungry worker looking for nearby restaurants on smartphone can get a 30% off coupon from a restaurant that's only a block away. A tourist arriving in a city may get ads for discounted lodging nearby. If LBA technology matures and becomes successful, the money spent on services such as Admob and Adwords is likely to decrease. An eWeek article expects the total value of LBA market to hit \$15B by 2018.¹²

Advertising technologies for the future

The autonomous cars will provide higher resolution displays optimally shaped and placed at convenient locations within the car for better enjoyment of video. In addition, technologies such as augmented reality (AR) and virtual reality (VR) will revolutionize how we interact with ads. For digital ads, these technologies will be able to provide an immersive 360-degree experience of ads that can let them virtually "try out the product", such as taking the viewer in the backdrop of a cold, snowy place to show them how a jacket will look on them in that surrounding. Companies with VR technology expertise will have a definite advantage.

¹² <http://www.eweek.com/mobile/location-based-advertising-market-to-hit-nearly-15-billion-by-2018.html>

Google has introduced a low cost VR solution, the Google cardboard and recently DayDream, that works with a smartphone. Facebook acquired Oculus Rift, a high-end VR solution.

Content streaming companies

Streaming content will play a big role in enabling the business model of “free rides through ads”. No one is going to watch a channel that only shows ads, it will be considered annoying. The preferred solution will be to show streaming content of short duration (10 to 25 minutes, typical for a TNC ride) and insert ads within the content as shown below–

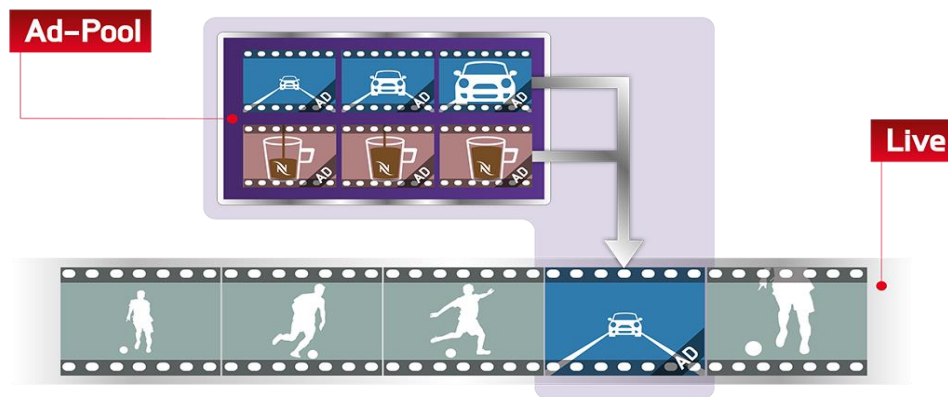


Figure 4 Dynamic ad insertion

Evolution of content streaming

One of the strongest forces of disruption seen in recent time is the phenomenon of chord-cutting. Since the inception of cable TV, consumers have been accustomed to paying a flat fee per month for subscribing to a fixed number of channels, though they may never watch many of these channels.

A new category of service offering content consumption through instant delivery via internet became popular, starting with YouTube for free content and Netflix for paid premium content.

Netflix is still the largest player in this segment with a market cap of \$55 billion, but other companies such as Hulu and HBO on the Go have also joined the fray. Combining both the over-the-top (OTT) streaming and subscription through TV, the market for streaming content is expected to exceed \$10B in 2016.

Advertisements within streaming content

Insertion of ads within streaming video is already a very large business that continues to expand.

There are a few stats available to summarize the impressive growth in this space:

- 197.5 million Americans watched online video in 2015, with Youtube and other Google sites claiming #1 position with 174.5 million viewers and Facebook coming second with 90.4 million viewers.¹³
- In 2017, online ad spending will exceed TV ad spending in US. Total online ad spending in 2017 will equal \$77.37 billion, or 38.4% of total ad spending.¹⁴

The two key items to describe online ad costs and revenues are CPM (how much it costs to show an ad 1000 times) and RPM (revenue per thousand views). YouTube has an average CPM of \$7.60, whereas Hulu has an average CPM of \$27.6.¹⁵ Hulu is able to charge this additional premium because YouTube ads are mostly pre-roll whereas Hulu ads are mid-roll.

Summary

In order to succeed in the future vehicular ad market segment, a company needs to have expertise and experience in the following areas – autonomous cars; ad networks; stream-able content; retail relationship with merchants who will advertise their products; design, including AR/VR, capability for improved quality of ads; and finally, since very few companies will have all of these, experience in investing and/or M&A will be essential.

The detailed analysis above is now summarized in a tabular form. Evidently only Google has all the required expertise, but other major players, shown in the table, can also compete with an M&A strategy.

¹³ <https://www.comscore.com/Insights/Rankings/comScore-Releases-November-2015-US-Desktop-Online-Video-Rankings>

¹⁴ <http://www.emarketer.com/Article/Digital-Ad-Spending-Surpass-TV-Next-Year/1013671>

¹⁵ <https://monetizepros.com/cpm-rate-guide/video/>

Company	Autonomous cars expertise ?	Ad networks ?	Streamable content –owned or partnered	Retail relations ?	Mobile apps capability	AR/VR capability?	Investment or M&A experience?
Google	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Uber	Yes	No	Yes	No	Yes	No	No
Tesla	Yes	No	No	No	Yes	No	Yes
Apple	Yes	No	Yes	Yes	Yes	No	Yes
Facebook	No	Yes	No	No	Yes	Yes	Yes

Table 1 Summary of Expertise of the Big Five

Disruption in Industry

Disruption in Current Landscape

The previous section identified the major components in the industry landscape. Every single of these segments are susceptible to major market disruptions as described below.

Rideshare

The extremely high market caps of some of the rideshare companies enabled them to raise up to a billion dollars in recent rounds without significant dilution. But it also raises the expectation in the minds of their investors that they will turn in large profits soon. In reality, Uber has lost money for many years and has just recently showed some profit in US. Its global businesses continue to incur large losses. The investors' expectations and the pressure from competitors will force these companies to offer novel incentives to their customers, and riding for free in exchange for watching ads will turn out to be a key incentive to lure passengers.

Ad Networks

Today's LBA technology is focused on a single static location. Ads in cars will use a more advanced form of the LBA technology. Since the location will continuously change, this needs to be fed back to the ad network and ads need to change accordingly. In addition, the autonomous car as an ad platform can offer the ultimate convenience (from the merchant's perspective) of directly driving the

passenger to the location of the store or restaurant whose ad was displayed, if needed.

Monetization of vehicular ads may still use elements of the Doubleclick technology, which will require an autonomous car to accept and store the equivalent of a computer cookie per unique passenger. These cookies, through the history of past rides, will be able to provide more detailed, personalized and relevant information than a standard Doubleclick cookie.

Streaming Content Providers

In spite of their popularity, content streaming companies are both fighting competition from each other as well as struggling to add new consumers. Vehicle ads could provide a boost to these companies' businesses and increase interest in short content such as documentaries and short films.

Timeline

The predicted disruption in autonomous vehicles will take place over the next 10 to 12 years. [Netscape founder] Marc Andreessen likes to say that, "right now the phone is an accessory to the car, but pretty soon the car is going to be an accessory to the phone"

The figure below explains the levels of autonomy that vehicles will be capable of.

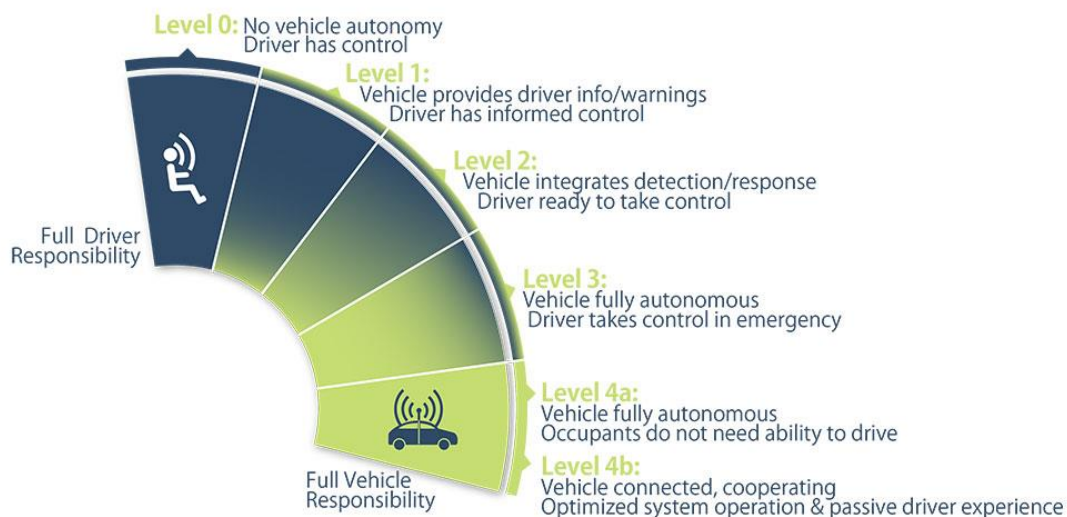


Figure 5 Autonomous Car Levels¹⁶

¹⁶ <http://www.leftlaneadvisors.com/project/nhtsa-levels-of-vehicle-autonomy-infographic/>

2018: We are witnessing the transition from Ridesharing 1.0, or the age of taxis, to Ridesharing 2.0, the time when Uber, Lyft, Didi and Ola are transforming what personal automobile transport means at a fundamental level. By 2018, due to increased competition between ridesharing companies, these companies will begin offering ad-supported discounted rides and new ad-network startups will emerge to serve this niche.

Today self-driving cars are still experimental although level 2 and 3 cars are on the market. Tesla announced that in 2018 they will have a Level 4 autonomous car and a ridesharing service available, signaling the start of the Ridesharing 3.0 era.

2020: By 2020, the ridesharing companies will be actively pursuing autonomous fleet options to supplement and eventually replace human drivers. Advances in screen technology and AR/VR will enable new types of ad-supported content for riders. Larger ad-networks will actively pursue these screens and ad dollars.

As touched upon in the Industry landscape section, the ridesharing industry has over 27M cars in the US, near 50M in service worldwide. It is anticipated that ridership will double by 2020. We also see that in 2020 the technology will be mature enough to allow Level 4 driverless cars in limited areas. It is also expected that the first fleets of dedicated self-driving cabs will appear in limited markets. These cars will have large displays for media consumption. To offset costs, the first attempts at targeted adverts will appear in these vehicles. It is expected that in 2020, cost, not availability will be a main driver for adoption.

2025: Post the 2020 Tokyo Olympics, autonomous fleets will grow and achieve Level 4b. Cost will continue to be a driver for customers, so much so, that many rides will be driven to the cost of free through the combination of very inexpensive car manufacturing, greater adoption of everyday riders and the growing value of the adverts.

2030: By 2030 the disruption of self-driving cars should be matured. The self-driving cab will come yet another extension of our mobile phones and digital consumption habits.

New Ecosystem

In this section we describe the types of businesses that will be needed to participate in and take advantage of the disruption from the section above.

Assets Required

Ad supported taxi services are more than just putting a screen in a car. The supply side of the network (the driver) goes away and pick-up time purely becomes a

function of the size of the autonomous fleet. This opens up the ride-sharing market to competitors that have access to the following assets:

1. The financial capability and partnerships to acquire a sizeable fleet of autonomous vehicles and the requisite machine learning and mapping expertise to create safe and reliable self-driving technology.
2. A direct channel to the consumer in a transportation context to quickly build traction for a new autonomous ride-sharing service.¹⁷
3. Content. Although some riders may have their own content, many will not, so partnerships with new short form content will create a revenue opportunity as well as a market differentiator.
4. Advertisement Network. This can be broken up into elements, creation, merchant outreach and analytics.

Having the fleet, access to users and content is good, having all 3 AND the advertising network would make a complete eco system.

Analysis of Existing Ad Networks

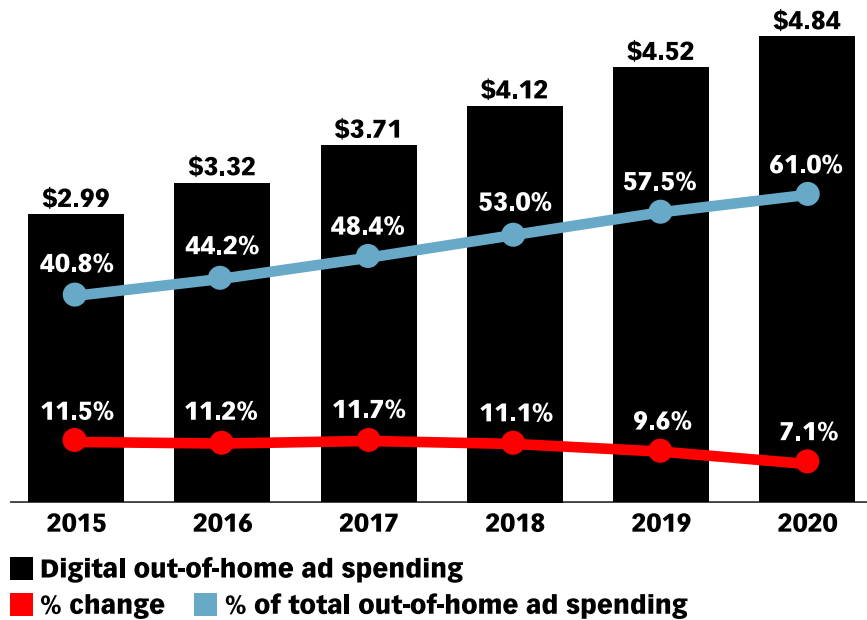
Having expertise or strong partnerships with ad networks is crucial to success in this approaching age of ad-supported ridership. The simplest definition of an ad network is as an intermediary that connects advertisers and their messages to consumers through a collection or network of visible end points. Traditionally, these endpoints could be roadside billboards, bus stops, park benches, television screens and more recently websites, mobile applications, gas station “fuel-top” displays, doctor’s office waiting rooms and digital screens in public spaces.

Two of the major segments of the advertising landscape of interest in the coming ad-supported transportation landscape are the Digital Out of Home and location-based mobile targeting segments. According to eMarketer, “Digital will make up 40.8% of total out-of-home (OOH) ad spending in 2015, up from 38.1% in 2014. By 2018, DOOH will capture 53.0% of total OOH ad spending in the US, or \$4.08 billion.”¹⁸

¹⁷ <https://www.appannie.com/insights/mobile-strategy/uber-google-future-ride-sharing/>

¹⁸ <http://www.emarketer.com/Article/Digital-Account-40-of-Out-of-Home-Ad-Spending-2015/1013107>

US Digital Out-of-Home Ad Spending, 2015-2020
billions, % change and % of total out-of-home ad spending



Note: includes out-of-home advertising (alternative, billboards, cinema, street furniture & transit) that is internet-connected
 Source: eMarketer, Sep 2016

216118

www.eMarketer.com

Figure 6 US DOOH Ad Spending

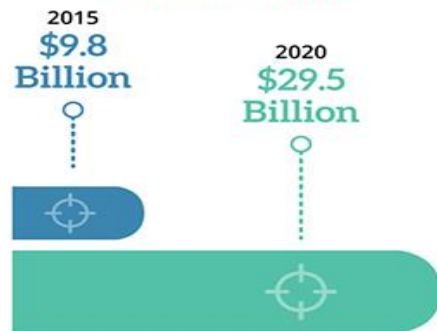
Growth of the location-based mobile segment is even more impressive; with research firm BIA/Kelsey predicting, “location-targeted mobile ad spending to grow from \$9.8 billion in 2015 to \$29.5 billion in 2020, a 24.6 percent compound annual growth rate.”¹⁹

¹⁹ <http://www.biakelsey.com/location-targeted-mobile-ad-spend-reach-29-5b-u-s-2020/>

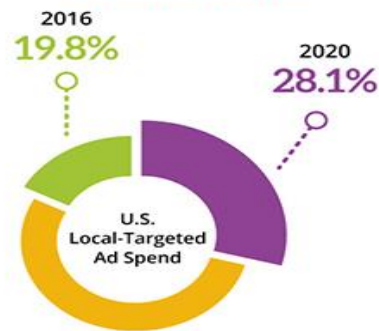
Location-Targeted Mobile Ad Spend

U.S. LOCAL ADVERTISING FORECAST 2016 SPRING UPDATE

Location-Targeted Mobile Ad Spend in U.S.



Native Social Advertising



Michael Boland
Chief Analyst & VP
Content, BIA/Kelsey



“Several market factors are currently bearing down on the mobile ad marketplace—[like] Google’s moves to adapt to an app-based world [and] the media consumption habits of millennials. These and other influences will require advertisers, publishers, agencies and ad tech players to rapidly innovate.”



Source: BIA/Kelsey U.S. Local Advertising Forecast 2016, five-year forecast delivering national overview of total U.S. spending in local markets and individual breakouts for direct mail, local video, local over-the-air television, local cable television, out-of-home/DOH video, newspaper, online, radio, mobile, directories, social and magazines

Figure 7 Location Based Ad Spend

Consumers who are in a waiting room, at a gas station, in an airplane or car are collectively targeted by marketers using techniques referred to as captive audience advertising, which is typically short-form video content either sponsored directly by an advertiser and/or punctuated by advertisements. This type of implementation requires an ad network to have a varied expertise, including DOOH and vehicular advertising competencies, location-based targeting capabilities, existing relationships with content providers and content delivery providers, and creative studio and advanced analytics capabilities. We analyzed a cross section of existing ad networks, including the known large players in the ecosystem as well as several companies uncovered in our research as players in important market segments such as DOOH, location-based targeting, and vehicular advertising.

Property	DOOH competencies	Vehicular competencies	Have access or own a platform	Location-based targeting capabilities	Existing relationships with content providers	Existing relationships with content delivery providers	Have creative content studio	Have technical talent to do next level analytics	Own video content	Own other content	AR/VR experience
Google Ad Network	testing	✗	yes	✓	✓	✓	✓	✓	✓	✓	✓
Yahoo Audience Network	✗	✗	yes	✓	✓	✓	✓	✓	✓	✓	✓
Conversant	✗	✗	yes	✓	✓	✓	✓	✓	✗	✗	✗
RadiumOne	✗	✗	yes	✓	✗	✓	✗	✓	✗	✗	✗
RhythmOne	✗	✗	yes	✓	✓	✓	✓	partners	✗	✗	✓
Exponential	✗	✗	yes	✓	✓	✓	✗	partners	✗	✗	✗
Advertising.com	✗	✗	yes	✓	✓	✓	✓	✓	✓	✓	✓
Vugo	✓	✓	yes	✓	✗	unknown	✗	unknown	✗	✗	✗
Xad	✓	✗	yes	✓	✗	unknown	✗	✓	✗	✗	✓
Thinknear	✓	✗	yes	✓	unknown	unknown	✗	✓	✗	✗	✗
Verifone	✓	✓	yes	partners	✓	✓	✗	unknown	✗	✗	✗
Creative Mobile Technologies	✓	✓	yes	✓	✓	✓	✗	unknown	✗	✗	✗

Table 2 Ad Networks and their Capabilities

Using a basic scoring mechanism, we created a Capability Score for each company to judge fitness across these multiple dimensions, revealing potential opportunities for acquisitions or partnerships to compete in this new space.

Property	Current worth (size)	Capability Score
Google Ad Network	~ \$500B (public)	8.5
Yahoo Audience Network	~ \$40B (public)	8
Advertising.com	Bought by Verizon for \$4.4B in 2015 (public)	8
RhythmOne	~ \$142M (public)	5.5
Conversant	~ \$12B (public)	5
Creative Mobile Technologies	Unknown (private)	5
Verifone	~ \$1.6B (public)	4.5
Xad	\$74M in 5 Rounds (private)	4
Exponential	Filed for \$75M IPO in 2013, withdrawn (private)	3.5
RadiumOne	\$87.5M in 3 rounds (private)	3
Vugo	\$200K Seed in 2015 (private)	3
Thinknear	Acquired by Telenav for \$22.5M in 2012 (public)	3

Table 3 Ad Networks Capability Scores

Based on this research and analysis, we believe there is a market need and that there are several potential opportunities in the ad network space that could complement the other components needed for success in the ad-supported ridership model we propose.

Intellectual Property and Regulations

In this section, we present a detailed investigation of regulatory, business and other constraints and challenges imposed on vehicular advertising. We anticipate that these challenges will play a significant role in shaping the upcoming disruption in the industry.

Legal challenges from other market players

Legal challenges can arise from other market players that are part of the same ecosystem. We look at the existing ecosystem today to get insight about potential future legal disputes.

In existing ride sharing market, Uber and Lyft (the biggest market players in the US) hire drivers as independent contractors, so legally they cannot be obligated not to advertise. Nevertheless, Uber discourages users from using existing in-vehicle advertisement service such as Vugo.²⁰ Uber cites citing customer expectations to feel in a privately owned environment rather than a regular taxi service as the reason behind its request, but the whole situation signals that a legal battle could be possible.

In the future, self-driving cars are likely to be owned and dispatched by the same entity, which would reduce the leverage of third party advertisers. We anticipate that a partnership with fleet owners would be necessary to get to the market.

Regulatory Challenges

According to our research, there are no existing federal or local regulations regarding “in-vehicle” advertising. One exception that showed in our research is that NYC Taxi and Limo Commission Rules prohibit advertising in “for-hire vehicles.” Existing advertisement network Vugo challenged that prohibition in court on grounds of free speech violation. The case is still going.

This case gives some insight that in the future, government regulations are expected to play a role in “in-vehicle” advertising either by setting standards or collecting extra taxes and fees.

²⁰ https://www.buzzfeed.com/johanabhuiyan/uber-discourages-drivers-from-displaying-in-car-advertisemen?utm_term=.merb65R23#.dwJodykW7

Legal Challenges from Patent Infringement

In this section, we introduce a detailed investigation of all the closely related patents in this area.

Fundamental Patents

Two companies submitted patents that are closely related that they can threaten future players in the field.

Vugo claims that its TripIntent® technology is patented. We could not find the actual patent application, which might indicate that it has been submitted less than 18 months ago. From the details released by Vugo, the application patents a method of selecting an ad based on current location and destination of the customer.

Google has two notable patents.

1. The first²¹ describes a method to receive information that includes (i) velocity at which a user device is moving and (ii) a direction in which the user device is moving. In response, the method should select a content corresponds to a location and the direction in which the user device is moving. The patent also focus on advertisement as it states “For example, if the user is specifically searching for information about restaurants in a city, then advertisements about restaurants can be targeted for the user. Of course, the position and velocity can be used to select (e.g., tailor and/or prioritize) the choices of restaurants advertised to the user.”
2. The second Google patent²² claims a method of linking online advertisements to free or discounted rides to the advertisers. It also claims a method of advertisement generation based on current location and/or user’s daily agenda. The patent also list autonomous cars as one field of use for this technology.

Broad Patents on Vehicle Advertisement

In addition to patents that are very close to describing “in-vehicle” advertisements, there are other patents that can be extended to cause potential legal challenges.

A general patent, owned by individuals, for in-vehicle advertising²³ uses GPS information to select the relevant advertisement. The technology described in the

²¹ Velocity based content delivery, <http://www.google.com.gh/patents/US9280212>

²² Transportation-aware physical advertising conversions, <https://www.google.com/patents/US8630897>

²³ Targeted Advertising in Conjunction with Consumer Detection, <https://www.google.com/patents/US20140129336>

patent covers methods to post advertisements both inside and outside vehicles. Another patent²⁴ in the same category is also owned by individual's claims to patent a method to collect vehicle existing location, destination and current traffic condition to come up with the proper advertisement. In addition, Apex Technologies²⁵ patents a method to finding the appropriate advertisement based on a tool that can identify the user.

Each of DoubleMap²⁶ and Yahoo²⁷ own one patent that both focus on maps and route generations. They use different techniques to achieve the same objective, which is select advertising based on given destination and display it on a map or the device displaying the route.

All generic patents mentioned in this section can be broad enough to pose some legal challenges. It is also noticeable that they collide together and can potentially collide with the proposed advertising system.

Patents on Related Technologies

Another set of patents target technologies that can be used in the ecosystem of “in-vehicle” advertisement. Although they might not target advertising primarily, they can support potential legal challenges. Ford²⁸ patents a technology to display content in autonomous vehicle, which implies a potential monopoly of in-vehicle display systems. This monopoly can extend to new advanced technologies like “in-vehicle” Augmented Reality or Virtual reality. Access to these systems would be required to display ads. Creative Mobile Technologies²⁹ patents a technology to charge vehicle customers credit cards in a vehicle. Similar to the display solutions, making payment would be an essential assisting technology for advertisement networks. Hence, a legal challenge to in-vehicular payment frameworks or in vehicular display solutions might directly or indirectly affect advertisements networks and change the future landscape.

²⁴ System and Methodology for Dynamic and Targeted Advertising in Vehicles and in Fixed Locations, <https://www.google.com/patents/US20130246181>

²⁵ Targeted Advertising in Conjunction with Consumer Detection, <https://www.google.com/patents/US20140129336>

²⁶ Route-linked advertising system and method, <http://www.google.tl/patents/WO2014066641A2>

²⁷ Context-sensitive route generation, <https://www.google.com/patents/US20100205060>

²⁸ Autonomous vehicle entertainment system, <https://www.google.com/patents/US20150094896>

²⁹ Credit card processing for a vehicle fleet, <https://www.google.com/patents/US20140330724>

Conclusion on Legal and Regulatory Landscape

We draw two main conclusions from our study of existing legal and regulatory hurdles. The first is that regulations that will define the market are either yet to exist or still in their early stage. The inevitable upcoming regulations will shape the new market and will have a business impact that cannot be predicted. The second is that intellectual property rights will play a role in the shape of the future ecosystem. The wide range of patents found in our survey indicates that they will play a role in shaping the future market alliances as well. Market players that do not have enough intellectual property rights will be prone to litigations from competitors, while those that have distinct intellectual property rights will have leverage against their partners and competitors alike.

Opportunities from the Disruption

As we laid out above, the personal transportation industry is about to undergo disruption. As autonomous cars mature, fleets are created and user rely on cheap on demand rides, the car itself will be an extension of personal rental space that can be used for business, entertainment or relaxation all through the mobile experience. The companies that can grasp this disruption can find opportunities to create, assemble or manage the new dependencies this ecosystem will demand. Riding in an auto cab will not be a singular experience but instead dependent on the circumstances of the ride. For example, the adverts you would show during a morning commute would not be the same as the evening commute, or running errands, or going out to eat. Understanding these differences and designing adverts that do not push users away will be a high demand skill.

As with any disruption, there is opportunity. Referring back to our list of ecosystem players, there is opportunity in leveraging low worth companies into a greater than its sum conglomeration focus on the new mobile advert environment. Taking ad networks as our example, we can compare various ad networks against a set of criteria.

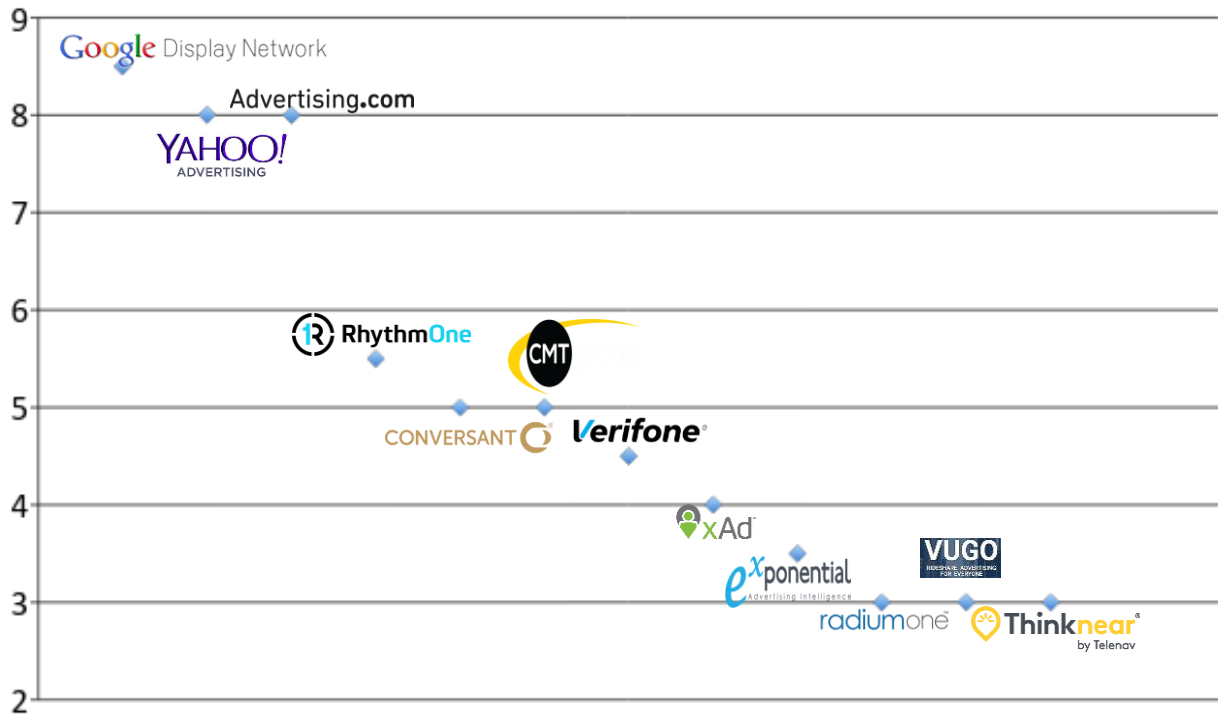


Figure 8 Comparison of Ad Networks

Clearly a Yahoo or an Advertising.com would be a great channel to supply ads to the burgeoning fleets, however these companies are far too expensive. Instead if one looks down market a bit, ThinkNear is not only cheaper, but has a greater focus on location based adverts.

The new fleet of autonomous cabs will not only change the nature of location based advertising, but the car itself will be a new type of display, thus we need to purchase or partner with a design firm that can focus on creating this new type of content. Speaking of content, having access to content will be key for those who does not want to connect their phones to the car. Partnerships with a Hulu or Netflix would be a great value add to the conglomerate. Finally, the fleet itself. In some cases, as with Pod Zero, the business model for the company is based on advert supported rides from the beginning. Purchasing, licensing or partnering with a group like that can provide addition cost efficiency and leveraging opportunity. In figure 9 we show one such combination. Razorfish as a design firm that can be pivot to focus on the new display platforms like 360 VR/AR. Radiumone for not only advert brokerage but for analytics focused on real-time movements. Pod Zero for a vehicle fleet and Hulu for Content.



Figure 9 Possible Conglomeration which addresses Advert based Personal Transport

Therefore we have identified an opportunity through acquisition and partnerships to take advantage of the disruption in personal transportation and the advert model that can support it. It is recommended to identify early the opportunities to invest in companies whose value will rise in the coming disruption.