

The Mobile Web: Key Industry and Technological Trends

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Abstract :

The paper will shed light on key trends for the mobile web in key countries, and then will focus of India specific figures to place India related trends in a global context. The paper will focus on two main parts: Market trends and technology trends in the mobile web space. In the former part, the paper will focus on analyzing usage patterns of the data from usage and download statistics from Opera Mini, which is one of the world's most used mobile browsers, taken over a period of the last one year, which allow us to get an insight into key usage trends regarding mobile web space in India. It will also focus on some demographic data, to give an insight on who are using the mobile web in India and worldwide. The paper will also shed light on the key opportunities and challenges that lie ahead regarding Indian mobile web usage, both from a market perspective and a technical and developer related perspective, and will provide further ideas on how these challenges can be addressed.

Key Words: Mobile web usage, trends, mobile web adoption.

1. Introduction

The mobile web has opened a more channel of communication and access to information, and as such, is of great interest to both network operators and end consumers alike. In India alone, the number of people who have a handset capable of accessing the data services/internet has risen to 127.04 million[1]. This number will only go up, as more and more sophisticated mobile phones enter the market. ARPU (Average Revenue per User) decreased by about 6-9% worldwide for operators in the last quarter of 2009[2]. Providing access to the mobile web, and hence gaining on data revenue, will have to be a priority to compensate for declining voice revenue.

In five years time, more people are likely to connect to the internet through mobile devices than the desktop computers[3]. When given the opportunity, users tend to flee carrier portal sites and like to browser the actual Web on their mobile devices[4]. The opportunity is there to take advantage of this fact, and abandon carrier walled garden in favor of allowing free access to the full web to users on mobile devices, thereby increasing data traffic.

Global mobile data traffic was 0.09 Exabytes per month in 2009, and is expected to increase to 3.6 Exabytes per month by 2014[5]. The mobile web is being used in various quarters, such as Industry operations management, advertising and even higher education[6]. It is imperative to understand the key trends and future possibilities in the area of the mobile web, both from a market as well as technological perspective. This paper will take a look at the key industry and technological trends regarding the mobile web, together with a focus on the Indian market.

2. Market Trends

Opera Software every month releases the 'State of the mobile web' reports[7], which analyzes on a Macro level, usage and handset data from over 50 million users of the Opera Mini mobile browser worldwide. The following market trends are based on the State of the Mobile Web report published by Opera Software for the month of January 2010[8].

2.1 Methodology

All content from Opera Mini users has to first be transcoded through Opera Mini's servers, and then sent to the client's device. Aggregated information is then published by Opera every month as part of the 'State of the Mobile Web' reports. Handset data is based on the number of people who have downloaded Opera Mini for that Month. Hence, these numbers do not reflect users of operator pre-installed versions of Opera Mini.

2.2 Results from the data

In the following few points, we will cover the usage patterns and other points of interest we have noticed while analyzing this data. The number of downloads as well as usage of Opera Mini has increased by more than 100% over the time it was first released. This suggests that more and more people are using the mobile web each year. We delved deeper and analyzed data from the last six months, and saw that usage has increased considerably every month. In January 2010, Opera Mini had about 50 million users, a 7.4% increase from December 2009 and up 149% compared to January 2009. In India, the number of unique users using Opera Mini grow by 236.3% from January 2009 to January 2010.

2.2.1 Handset Usage

There is a clear trend of domination of the market with regards to the mobile web by a particular handset manufacturer, especially in developing countries. In India, in January 2010, the top ten handsets used to download Opera Mini were all from Nokia, the most popular being the 'Nokia 5130 XpressMusic' model. The other markets where in January 2010, the top ten handsets for downloading Opera Mini were all from Nokia, were - Indonesia, Vietnam and China.

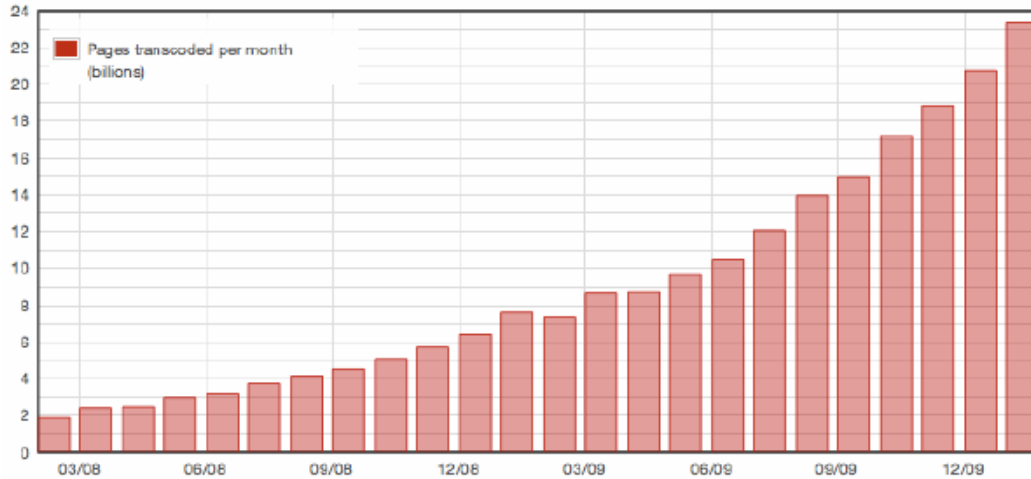
Contrary to that trend is the United States, where out of the top ten handsets, four of them were Blackberrys, followed by two each from Nokia, LG and Samsung. The most popular phone in the US for downloading Opera Mini was the model 'BlackBerry 8330 ("Curve")'.

2.2.2 Mobile Web Usage

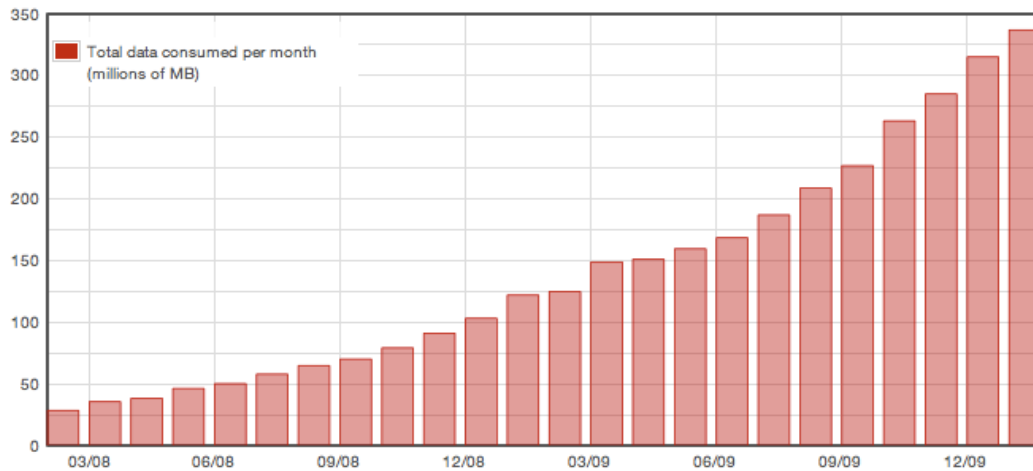
The countries which we found to have the largest traffic use for Opera Mini was Russia, followed by Indonesia, India, Ukraine, China, South Africa, USA, Nigeria, Vietnam and Great Britain in that order. There are certain similarities and certain jarring differences in the usage patterns of these markets, which we will explore further.

2.2.2.1 Pages Transcoded

Page view traffic, or the pages transcoded by the Opera Mini servers, every month for Opera Mini has increased from 7.5 billion pages in January 2009 to 23.3 billion pages in January 2010 which represents an increase of 208%. In India, page view traffic has increased by 225.9% from January 2009 to January 2010, with 6MB of data consumed per user per month, and 344 page views per user per month for January 2010.



2.2.2.2 Data Consumed



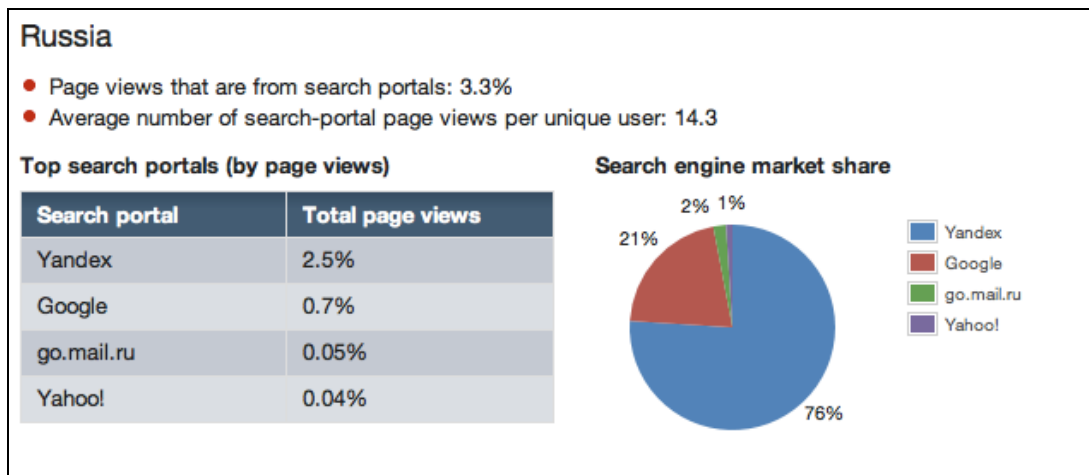
In January 2010, Opera Mini users generated over 337 million MB of data for operators worldwide. This is a 7% increase since December 2009 and a 176% increase since January 2009. Data by Opera Mini servers is compressed by up to 90%. If this data were uncompressed, Opera Mini users would have viewed over 3.1 Petabytes of data in January 2010.

2.2.2.3 Top Websites Viewed

In India, for the month of January 2010, the ten most visited websites using Opera Mini were the following (listed in descending order of traffic):

- 1.google.com
- 2.orkut.com
- 3.facebook.com
- 4.wikipedia.org
- 5.youtube.com
- 6.yahoo.com
- 7.songs.pk
- 8.zedge.net
- 9.getjar.com
- 10.wap.in

Google, a search engine, is the most used website for Indian users of Opera Mini, however, orkut.com and facebook.com are the second and third most used sites, indicating a strong trend towards growth of social networking on the mobile web. Songs.pk and youtube.com indicate an inclination towards general leisure related sites on the rise, with zedge.net, getjar.com and wap.in suggesting that users are also interested in downloading certain mobile related content on their phones.



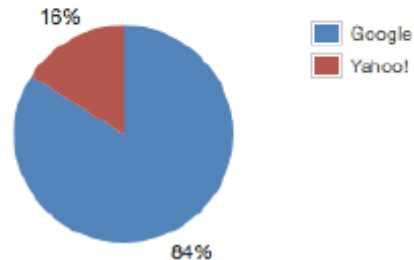
India

- Page views that are from search portals: 22.1%
- Average number of search-portal page views per unique user: 75.8

Top search portals (by page views)

Search portal	Total page views
Google	18.5%
Yahoo!	3.5%

Search engine market share



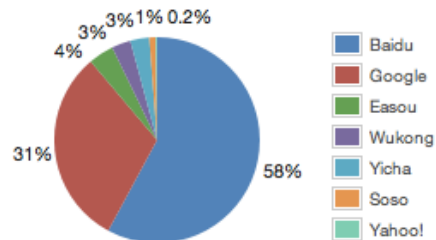
China

- Page views that are from search portals: 13.5%
- Average number of search-portal page views per unique user: 34.5

Top search portals (by page views)

Search portal	Total page views
Baidu	7.8%
Google	4.2%
Easou	0.6%
Wukong	0.4%
Yicha	0.4%
Soso	0.07%
Yahoo!	0.03%

Search engine market share



It is notable that there is an absence of certain categories of sites on this list, such as news sites, as well as transaction based sites like ones related to travel tickets and online shopping.

2.2.2.4 Search Engine Market Share on the Mobile Web

According to our data, search engines are the most used category of websites on the mobile web. It is interesting to note the usage of different search engines in different markets, and the trends it can tell with regards to localization and internationalization. Opera Mini users in Vietnam and India are the biggest users of search portals. In Vietnam, 30.9% of page views are from search portals, and users viewed an average of 63.6 search portal pages per month. In India, 22.1% of page views are from search portals, and users viewed an average of 75.8 search-portal pages per month.

Opera Mini users in Ukraine use search portals the least: 0.8% of page views are from search portals, and users view only an average of 6.1 search-portal pages per month.

In India, Google was the most used search engine with approximately 84% of search

engine usage, followed by Yahoo with approximately 16% usage (All search providers with less than 0.01% of page views have been omitted in the study)

Worldwide, we found that Google was the most used search engine in most markets, except for two notable exceptions. In Russia, we found more people to be using Yandex, with 76% of mobile search engine market share, followed by Google.ru with 21%. In China, Baidu was the most used search engine with 58% market share followed by Google with 31%. This trend suggests that in some markets, where english is not the standard language, there is a greater need to localize and translate content so it is better suited to local audiences.

2.3 Challenges and Opportunities

One of the biggest challenges facing the mobile web is language. On the web, the ability to read and write particularly required. However, there is an opportunity for network operators to increase network speeds for mobile web access, so that content such as audio and video, which does not require the ability to be literate to a great extent, can also be consumed. The ability to consume audio and video properly on the mobile web can be a big force in increase in usage of the mobile web in general, and due to the greater size of audio and video content relative to just text, it can result in greater ARPU for network operators as well. By 2014, 66% of worldwide mobile data traffic per month is expected to come from mobile video[5].

Another challenge is lack of proper localization of sites. Many people may be literate, but not in the language that the site is in. To achieve top market share in certain markets, particularly China and Russia, it is imperative to localize and adapt to the local environment as much as possible. Furthermore, another challenge appears to be websites which are designed keeping only the desktops in mind. Mobile browsers come in all shapes in resolutions, and it is imperative for web developers of today to keep in mind the mobile web while making websites. The W3C Mobile Web Best Practices Guidelines[9] provide a good resource for such information.

Other opportunities in this field include better standards and technologies, which developers can use in the future to make more compelling applications for the mobile web. Platform fragmentation has occurred in today's scenario, where each platform or Operating System (such as Windows Mobile, Android, Symbian, etc) has it's own system through which applications have to be made. The Web is the only viable way through which applications can be be made once so that it has a chance to run across all these platforms.

3. Technological Trends

Upcoming standards and technologies will play a big role in the future of the mobile web. Here we will explore some of these, and how they fit in the context of the mobile web.

3.1 Mobile Widgets

Mobile widgets are mobile applications built on standard web technologies of HTML, CSS and JavaScript, many times using development techniques such as AJAX. Because it uses standard technologies which almost all know by way of web development, they are much easier to develop. Widgets are supported not just on cell phones, but also on some other devices such as certain TVs, cars and personal media players[10]. This gives widgets the ability to be able to run on a number of devices with minor effort required from the developer's side.

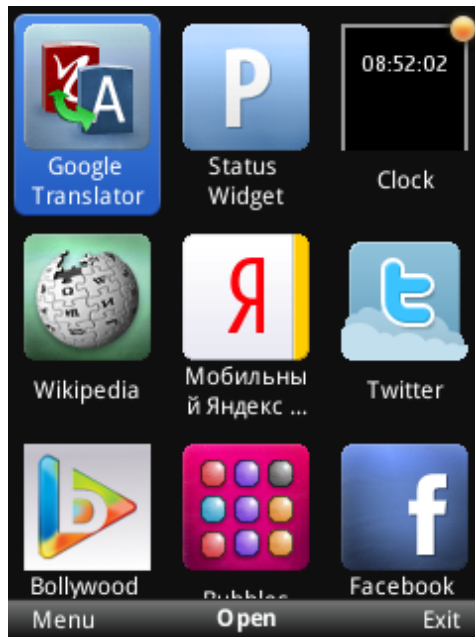


Fig. Opera Widgets Manager on S60 Platform



Widgets running inside a car's dashboard display system

3.1.1 Mobile widgets in the near future

Widgets right now are gaining ground as a viable way to make mobile applications, as evidenced by its heavy promotion by certain big network operators and handset manufacturers[11][12]. However, they are still right now somewhat limited in scope, as many device specific features cannot be performed by them natively, which is often a difficulty.

In April 2008, China Mobile, SOFTBANK and Vodafone (and later on Verizon) came together to form the Join Innovation Lab, or JIL[13], which is envisioned to be a platform for mobile widgets. The Open Mobile Terminal Platform also came up with a vision for the future of mobile widgets, called BONDI[14].

Both JIL and BONDI aim to provide a standard set of APIs[15][16] with which developers can make mobile widgets which can take greater advantage of the device's capability. Examples of such capabilities could include connecting to the camera phone, sending and receiving SMS, using the address book, access to external web services etc. Providing such capability will further enhance the utility and value of developing widgets for mobile devices.

Recently, more than twenty four telecom companies announced the "Wholesale Applications Community"[17], a joint effort to offer a central marketplace for mobile applications which would rely on APIs such as JIL and BONDI to provide developers a platform to create applications which work in a cross device and platform way. The alliance represents more than three billion customers worldwide.

3.2 QR and other 2D matrix codes

Matrix codes are increasingly being used as a way to provide electronic boarding passes as well as various tracking applications for inventory control, as well as advertising. The advantage of 2D Matrix barcodes is that more information can be stored in it than 1D barcodes, and it is possible to be encrypted as well as sent easily by mobile phones.



QR code encoding the text 'Sample'

QR codes are a form of 2D matrix barcode which can encode information such as URLs, text, etc in it. Some devices have decoding software which can decode this information and provide the user with the information. An example of QR code use in the industry is by JCPenny, a popular retail chain, which have used QR codes to provide online coupons, which are sent to consumers' mobile devices. This code, when presented at the store, is scanned and the user is provided a discount[18].

The IATA (International Air Transport Association) has selected QR codes, Aztec codes, and Data Matrix, another form of 2D barcodes, as a standard for online flight ticketing information as part of it's BCBP (Bar Coded Boarding Pass) standard[19]. Trinity Mobile reported a 1200% increase in users using its mobile boarding pass services for 2009[20]. An opportunity exists for various online ticketing retailers as well airline companies to grow in the area of electronic boarding passes, thereby reducing ticketing costs in the long run.

3.3 HTML5 and other upcoming trends and technologies

The new version of HTML, called HTML5 [21] has a number of new features which would enable the future of web apps, even on mobile, to be much more easy to develop, and use. Apart from HTML5, other new standards and technologies are also coming up, which should be useful in developing future mobile applications, particularly when used in mobile widgets.

3.3.1 Offline Web Applications and Storage

Besides that, HTML5 supports a mechanism for offline storage of web applications, referred to as 'application cache'[22] or 'app:cache'. With this, developers can specify which files they want available to be viewed offline, and when the user is not connected to the internet, they can still use those files offline. This is especially useful in the mobile context, where signal strength may vary from one location to another, and may not be present at all in certain places (remote areas, tunnels and subways, etc). Offline Web Applications can play a useful role in this regard.

The W3C Web Storage API[23] provides a way to store user information in a better way for developers, so that there is persistent storage of information using the 'localStorage' property, and temporary storage using the 'sessionStorage' property. This will result in a much better way to store user data on the client side, and could be of much use in mobile web apps and widgets in the future.

3.3.2 Graphics, Multimedia and User Interfaces

HTML5 also includes native support for audio and video, with the <audio>[24] and

<video>[25] tags. Right now, to play audio and video, use of external plug ins are required, which may or may not be present on a device, furthermore, they tend to be resource intensive, which is not good for mobile devices with very limited computing power and battery life. Support for <audio> and <video> tags in mobile browsers will mean that no external plug-ins would be required to run audio and video content. It could be played natively straight from the browser itself.

The canvas tag[26] in html5 allows programmable graphics using just JavaScript, which can allow for easy rendering of charts and graphs, as well as games and other interactive content. Scalable Vector Graphics, or SVG[27], is already being used in the mobile space with the S60 platform having native support for it. SVG provides vector graphics which can scale to different resolutions without affecting quality of the image. This means you can have the same quality of graphics using SVG on a big screen TV as well as a tiny mobile device.

CSS3[28] is another standard being implemented by makers of browsers. It will help in making better web graphics easily. Features of CSS3 include rounded corners, multi-column text, drop shadows, transitions and transforms, and more. Many mobile browsers already have support for CSS3 media queries[29], with which it can be specified which layout to use for which resolution. For example, a developer can specify a different set of CSS properties for all devices with a certain width and height, and a different set of CSS properties for other devices which support a greater width and height. Since mobile phones all have such a large variety of resolutions, support of media queries in web apps makes it very useful to cater to all of them, and provide the best interface in a easy manner.

3.3.3 Geolocation

Location based services are an exciting area of web applications, especially in the field of mobiles. More and more new web applications are starting to integrate it, including the popular micro-blogging site, Twitter.

W3C Geolocation API[30] is a standard for providing web application developers a way to get accurate information about the user's location using a standard way. Unlike some

of the current ways of determining location right now on the web, the specification for the Geolocation API states that the browser or user-agent must explicitly ask the permission of the user to share his/her location information. This results in much better privacy control than conventional methods. Location information can be used to provide additional services such as location aware suggestions for services and shops, location targeted advertising, turn by turn route navigation, etc.

4. Conclusion

Web usage on mobile devices is increasing at a very fast rate. Data traffic is increasing whereas voice traffic is decreasing, and hence it makes sense to provide access to the mobile web to people to consumers. Certain developed countries have a prevalence towards using smart phones for internet access on mobiles, whereas the developing countries still rely to a great extent on feature phones. Search engines are the most popular category of websites viewed, followed by social networking sites. Sites related to general leisure as well as content downloads have good potential for growth on the mobile web. Mobile Widgets, which are small specialized web applications written in web standards, are gaining momentum, and upcoming APIs could provide greater power and functionality to such widgets. 2D barcode systems are increasingly being used in industry. New and emerging standards like HTML5, Web Storage and Geolocation also provide a potential for more engaging, useful and powerful

web experience on the mobile devices front.

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