

# An Empirical Analysis of Facebook's Free Basics Program

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## 1 BACKGROUND

Facebook's Free Basics program offers a set of zero-rated web services, in collaboration with cellular providers in select developing countries [4]. Subscribers of these cellular providers can access Free Basics participating services without incurring data charges by using their mobile phone browsers or via an Android app [2]. The program has grown to more than 60 countries in its first two years [8], with 25 new countries added since May 2016 [10]. These are some of the most densely populated countries in the world [1], with low levels of Internet accessibility but very high rates of mobile phone usage [6, 12]. Facebook claims that Free Basics can bridge this accessibility gap by bringing more people online for free [3] and, therefore, has the potential to bridge the "digital divide" [15].

The program has also created controversy with strong opposition from proponents of an open Internet [7, 13]. They have raised several concerns. First, Facebook alone controls which services are offered in Free Basics, potentially enabling content restrictions in the form of a "walled garden Internet" for its users. Second, Facebook requires that data passes through its proxies in plain text, potentially compromising Free Basics users' privacy. Last, by offering only a subset of Internet services for free, Facebook potentially violates

net neutrality by enabling unfair competition between the zero-rated Free Basics services and the paid web services that do not participate in Free Basics. These concerns have caused regulators to take action in some countries [7]; for example, India ultimately banned the service [9, 14]. Even in countries that allow Free Basics, there are questions as to how popular it is [5], and whether it is attracting first-time Internet users as claimed [11].

## 2 RESEARCH QUESTIONS

In this paper, we develop a suite of measurement techniques to improve the transparency of Free Basics and inform policy debates with empirical evidence. While our study necessarily focuses on Free Basics, our approach can be applied to any similar zero-rated and proxied services that arise. Our analysis answers the following key questions covering different aspects of the program:

- **Free Basics services:** What services constitute the current walled garden of Free Basics? Are these services same across countries? Are these services growing over time?
- **Free Basics users:** How many visitors does a typical service get, and from which countries, demographic and economic backgrounds?
- **Free Basics architecture and Internet providers:** What network quality are the services given, as a trade-off for free access? Which party is primarily responsible for the quality: Facebook or the participating cellular providers?

## 3 METHODOLOGY

We answer these questions using the following measurement methodology. First, we implement an Android app to scalably collect Free Basics service lists across countries and over time. Second, we deploy our own Free Basics services to understand Facebook's approval and deployment process, and to characterize users who visit our services. Third, we use dedicated clients in Pakistan and South Africa and run controlled experiments against our services, allowing us to characterize the Free Basics proxy architecture, network QoS, caching, and data-encryption policies.

Our main contributions in this paper are as follows:

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- We design experiments with multiple vantage points to audit Free Basics.
- We collect empirical data and use them to provide visibility into its services, users, and networks at scale. Our approach can be applied to audit similar programs—be it a global program or one that is ISP-specific (e.g., T-Mobile’s Binge On or Videotron’s “Unlimited Music”).
- We use our observations to evaluate concerns and acclamations about the program to facilitate informed debate.

## 4 KEY RESULTS

Our measurements provide insight into Free Basics’ architecture, users, content providers, and cellular service providers. Specifically, we highlight the following key findings:

- There are currently 200-450 Free Basics services across three countries of Bangladesh, Pakistan and South Africa. Most of the services are country-specific, and they have grown by 100-150 new services over the last nine months.
- One of our Free Basics services Bugle News, an RSS news feed aggregator offered in English, Spanish and French, attracted 49.2K unique visitors from 45+ countries between Sep 2016 and Jan 2017. These users were characterized by both high- and low-end mobile devices, indicating Free Basics being used by its target user population with limited technical means, but also by others who are more well off.
- Free Basics services get 4x–12x worse network throughput than their paid counterparts. We isolate the root causes to network path inflation and bandwidth limits from both Facebook proxies and/or cellular providers.

## 5 DISCUSSION

One of the main points of opposition of the Free Basics program has been “why do services need Facebook’s approval to get enlisted in the Free Basics program?”. In our experience of deploying Free Basics services, Facebook’s feedback has been strictly technical. Our overall experience has been very positive.

A second point of concern has been “all data will flow through Facebook’s proxies”. Our deployment experience validates Facebook’s advertised architecture of a proxy network. We identify that there are at least two proxy servers on the Free-Basics path between the mobile client and the web server.

A third point of concern has been “some free services included in the program have unfair advantage over other services not part of the program, violating net neutrality”. Our measurements show that the download speeds for Free Basics services can be 4-12x worse than their paid counterparts. Further, the performance depends strongly on factors like path inflation between the mobile client and the web server, throttling policies at Facebook proxy servers, and traffic differentiation policies of individual cellular providers. This implies that the net neutrality debate should have more nuance than the “free vs. paid” arguments, asking additional questions like “free, but at what cost?”

A fourth concern has been that it claims “to bring millions of poor and first time Internet users online” [3], while opponents claim “people use it only as a stop gap measure when they run out of data charges” [11]. We analyze the device capabilities from where we receive server requests. Our observations show a mix of relatively expensive high-capability mobile phones, as well as a large number of requests from WAP browsers typically found on low-cost devices. This gives support both in favor of and against the debate.

Finally, in the presence of all concerns about Free Basics, one might ask whether it is contributing to a social good.. Analyzing the currently deployed Free Basics services, we find some excellent services on health, education, social awareness, news and other topics. Moreover, we found that even a simple RSS feed aggregator service on Free Basics can get 49.2K unique visitors within 4 months from 45+ developing countries, as we experienced with Bugle News. Thus creative thinking on how to harness this platform with services might help advance many research objectives targeting a Free Basics user population.

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