Inside the Walled Garden:
Deconstructing Facebook's Free Basics Program

Rijurekha Sen, Sohaib Ahmad, Amreesh Phokeer, Zaid Ahmed Farooq, Ihsan Ayyub Qazi, David Choffnes and Krishna P. Gummadi

MAX PLANCK INSTITUTE **FOR SOFTWARE SYSTEMS**

LUMS

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Northeastern University

Facebook's Free Basics – what is it?
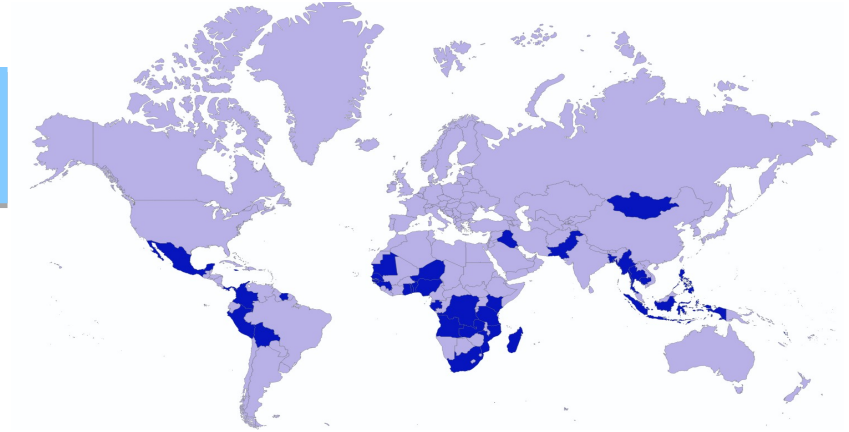
Free Basics by Facebook

Free Basics by Facebook provides people with access to useful services on their mobile phones in markets where internet access may be less affordable. The websites are available for free without data charges, and include content on things like news, employment, health, education and local information. By introducing people to the benefits of the internet through these websites, we hope to bring more people online and help improve their lives.

Image from: https://info.internet.org/en/

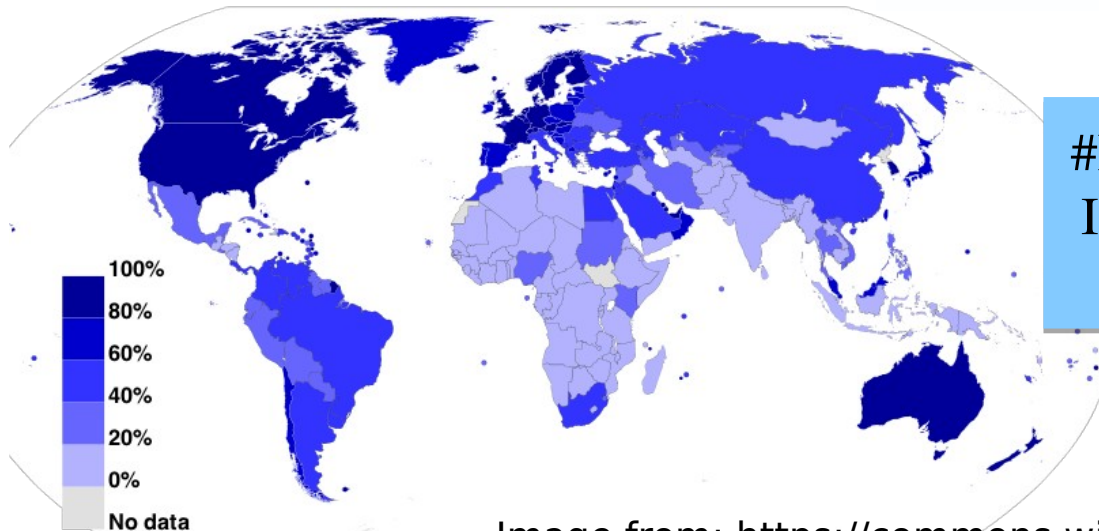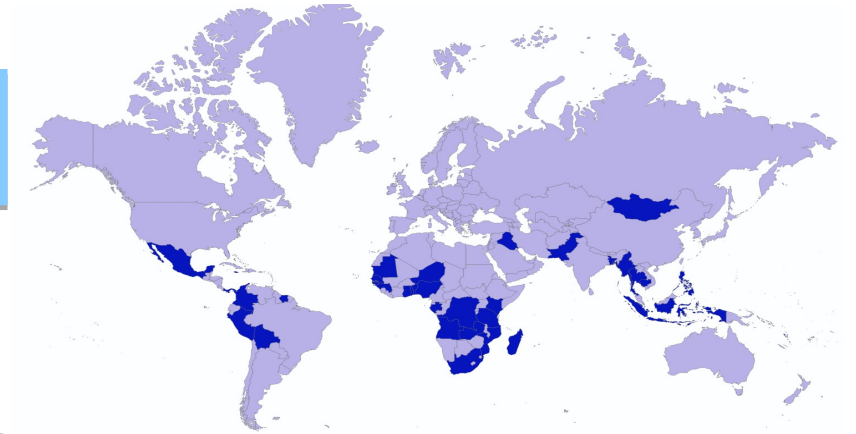Zero-rated web service offering, hoping to bridge digital divide.

Facebook's Free Basics – where is it?

63 countries in Asia, Africa, South and Central America.

Facebook's Free Basics – where is it?

63 countries in Asia, Africa, South and Central America.

#Internet users as % of population International Telecommunications Union (2012).

100%
80%
60%
40%
20%
0%
No data

Image from: https://commons.wikimedia.org/w/index.php?curid=19202338

Facebook's Free Basics – where is it?

63 countries in Asia, Africa, South and Central America.

#Internet users as % of population International Telecommunications Union (2012).

100%
80%
60%
40%
20%
0%
No data

Image from: https://commons.wikimedia.org/w/index.php?curid=19202338
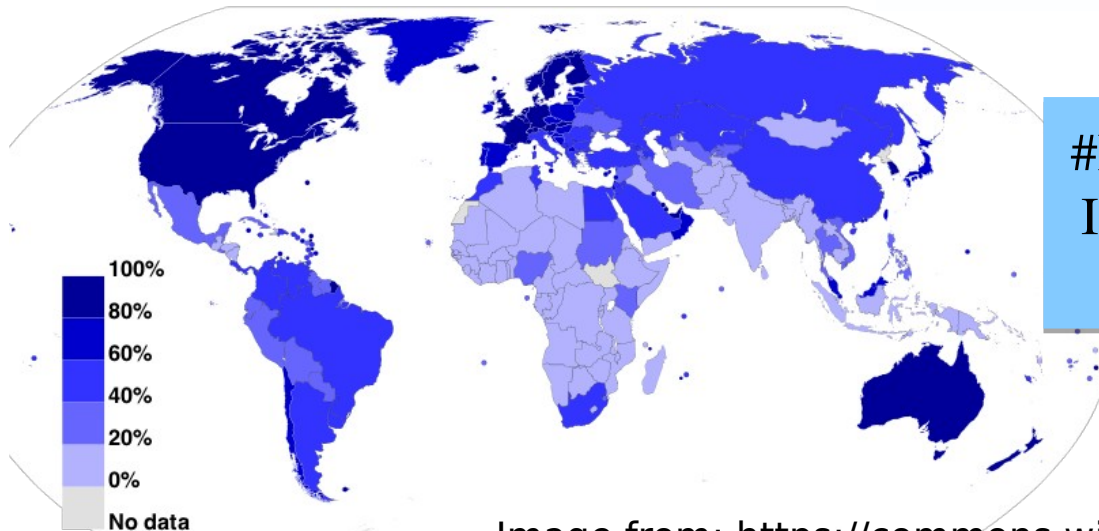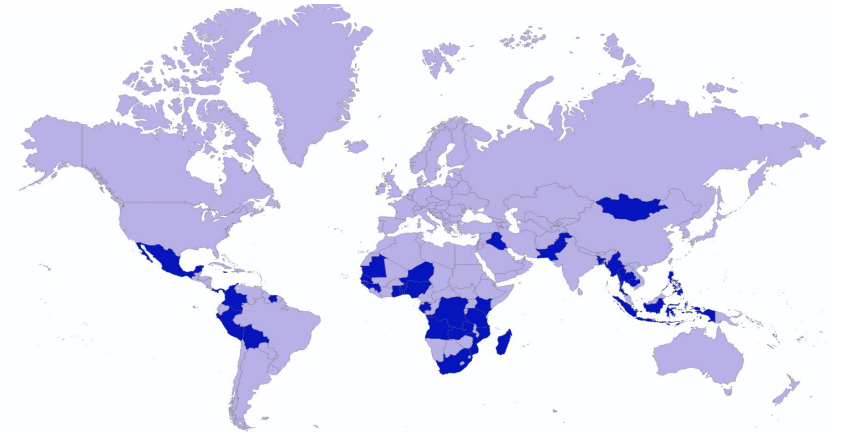
Free Basics is targeted to countries with low Internet penetration.

Why deconstruct this program?

Why deconstruct this program?

Facebook's Free Basics service has been banned in India

The country has said no to zero-rating schemes

By James Vincent | @jjvincent | Feb 8, 2016, 6:22am EST

Facebook lures Africa with free internet - but what is the hidden cost?

Some see Mark Zuckerberg's plan to wire up the continent as a philanthropic gesture, others suspect a cynical marketing ploy

Log in with Facebook

▲ Facebook chairman Mark Zuckerberg has said access to the internet is a 'bas...
Edelson/AFP/Getty Images

Watch full video

NDTV

WILL TELECOM REGULATOR GIVE FACEBOOK A FREE HAND?

OpenMedia is a community-based organization that safeguards the possibilities of the open Internet.

OPEN media

ATTN: Mark Zuckerberg, Chairman and CEO, Facebook
CC: Kevin Chan, Head of Public Policy, Canada, Facebook

Re: Opening Internet.org and Free Basics

OpenMedia and our supporters around the world are gravely concerned with the discriminatory practices of Facebook's Free Basics platform (previously called "Internet.org"). Many of the concerns raised in the *Open Letter to Mark Zuckerberg Regarding Internet.org, Net Neutrality, Privacy, and Security* sent from OpenMedia and nearly 70 other organizations from 31 countries have yet to be adequately addressed. Since the letter was published, we have engaged over 60,000 Internet users from around the world through our *No Fake Internet* campaign, and, recently, ran a large *billboard* near your head office in Palo Alto, California.

7

FREE FOOD & our audit questions

& our audit questions

Doesn't this give Facebook censorship rights?

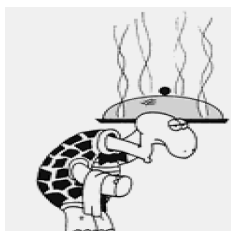How does Facebook's gatekeeping for Free Basics services work?

& our audit questions

Doesn't this give Facebook censorship rights?

How does Facebook's gatekeeping for Free Basics services work?

Won't non-free services be at an economic disadvantage?

Does this net-nutrality question need more nuance?
Should we ask the question: *"Free, but at what cost?"*
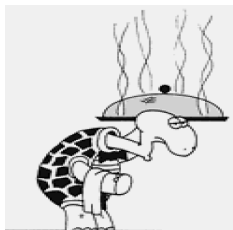How is network QoS for the free services, compared to non-free?

FREE FOOD & our audit questions

Doesn't this give Facebook censorship rights?

How does Facebook's gatekeeping for Free Basics services work?

Won't non-free services be at an economic disadvantage?

Does this net-nutrality question need more nuance?
Should we ask the question: *"Free, but at what cost?"*
How is network QoS for the free services, compared to non-free?

Are the poor using this, as claimed by Facebook?

What demographics, interests and phones do the visitors have?

& our audit questions

Doesn't this give Facebook censorship rights?

How does Facebook's gatekeeping for Free Basics services work?

Won't non-free services be at an economic disadvantage?

Does this net-nutrality question need more nuance?
Should we ask the question: *"Free, but at what cost?"*
How is network QoS for the free services, compared to non-free?

Are the poor using this, as claimed by Facebook?

What demographics and phones do the visitors have?

Is this just a hype?

What services are there? Are they growing over time?
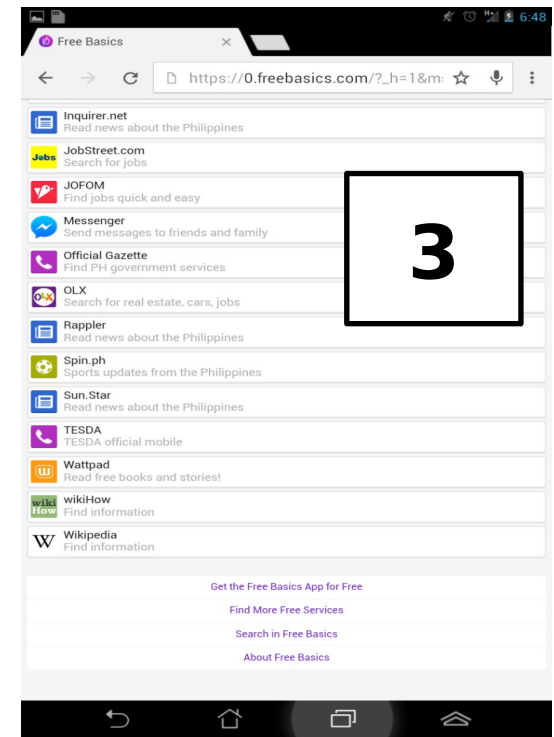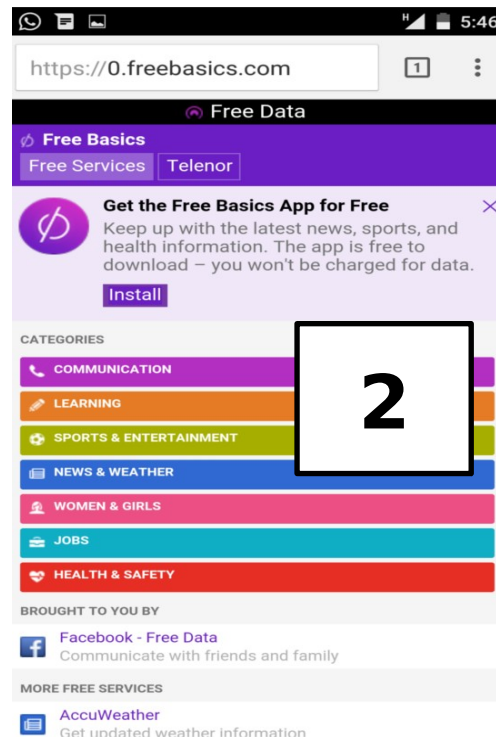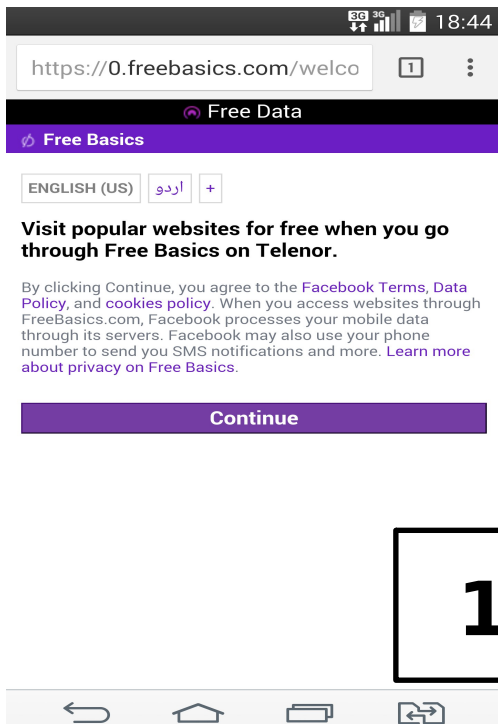
Free Basics App or Web-Service

USER MOBILE

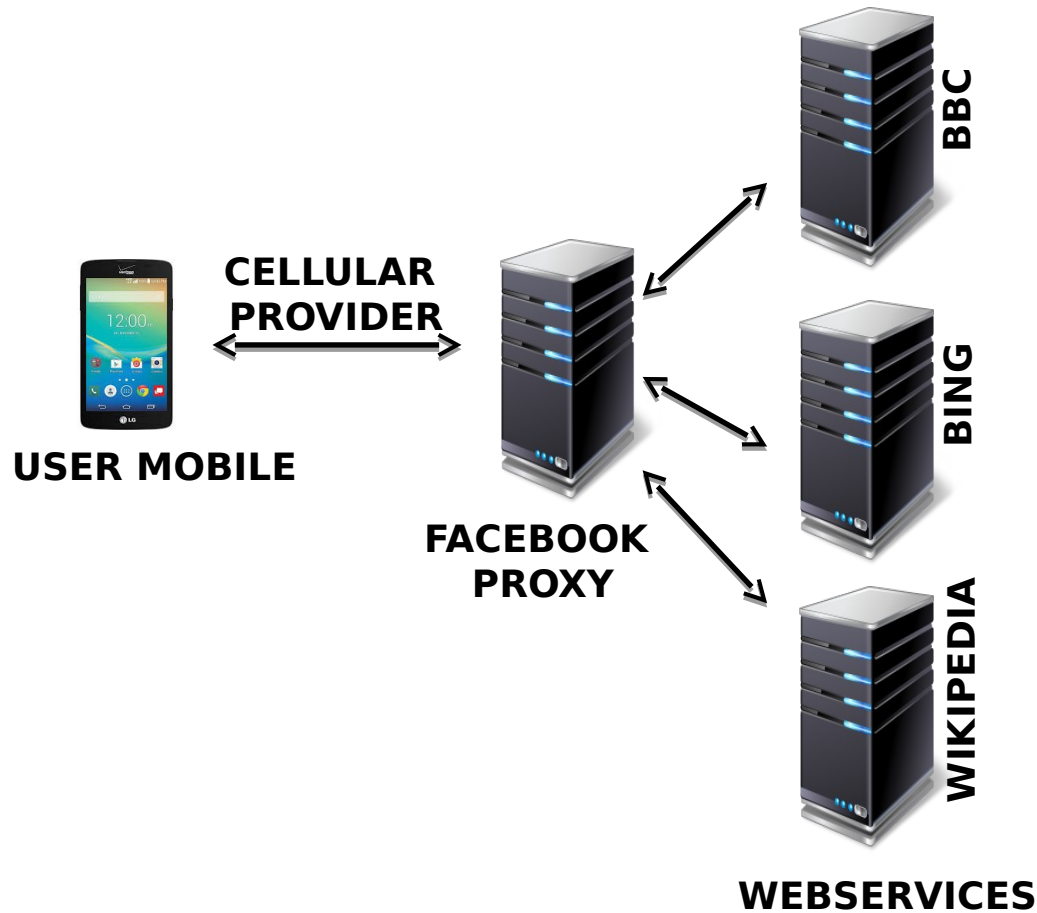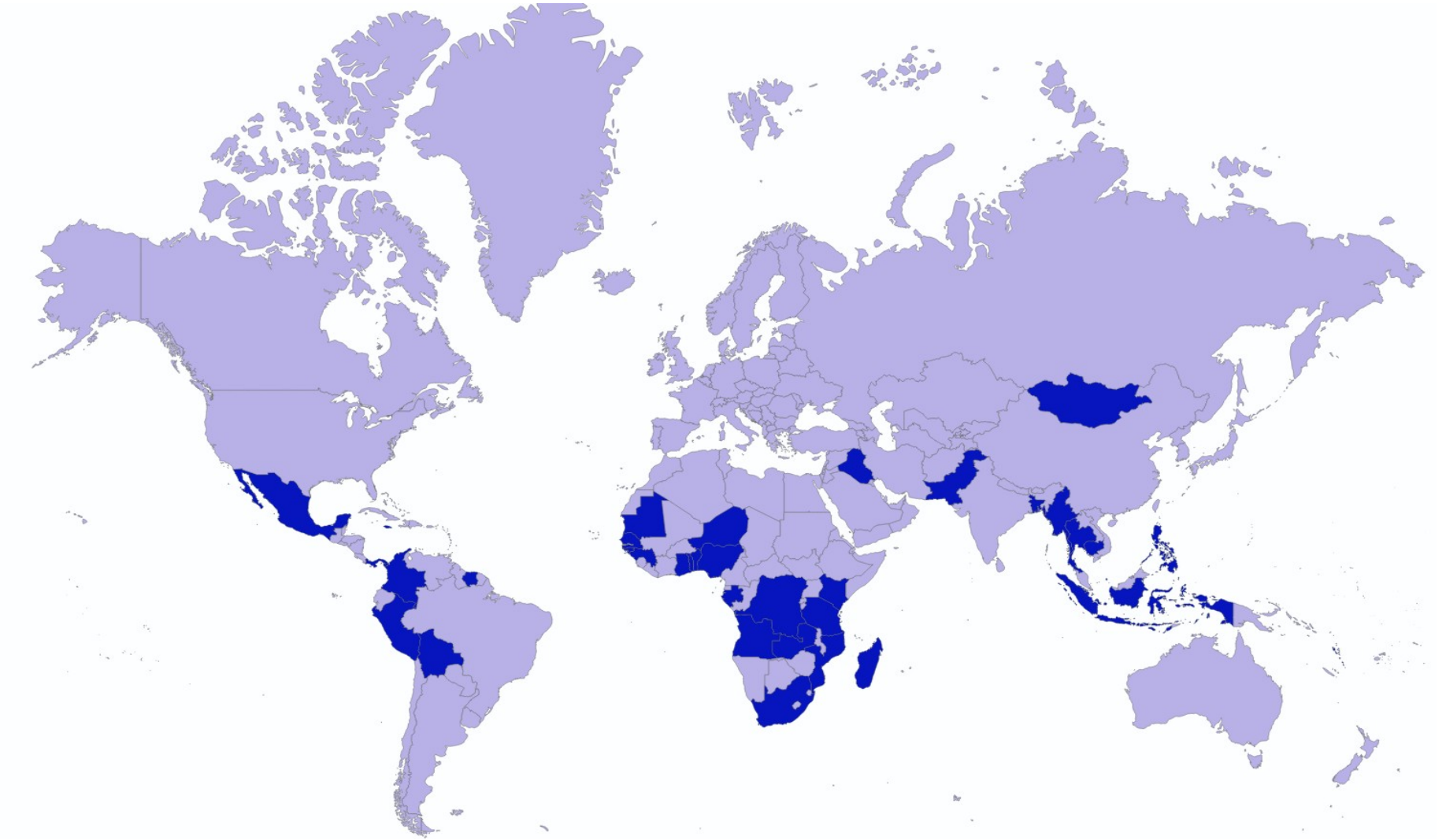# Free Basics App or Web-Service

Free Basics Architecture

USER MOBILE

Free Basics Architecture

CELLULAR PROVIDER

USER MOBILE

FACEBOOK PROXY

Free Basics Architecture

Measurement Challenge

Measurement Challenge

Virgin Mobile MX

Robi Axiata Ltd.

Tigo

Unitel T+

Digicel Panama

Telenor

Globe and TM

MTN Benin

Airtel   Cell C

TrueMove H

Airtel Niger

Indosat Ooredoo

Measurement Challenge
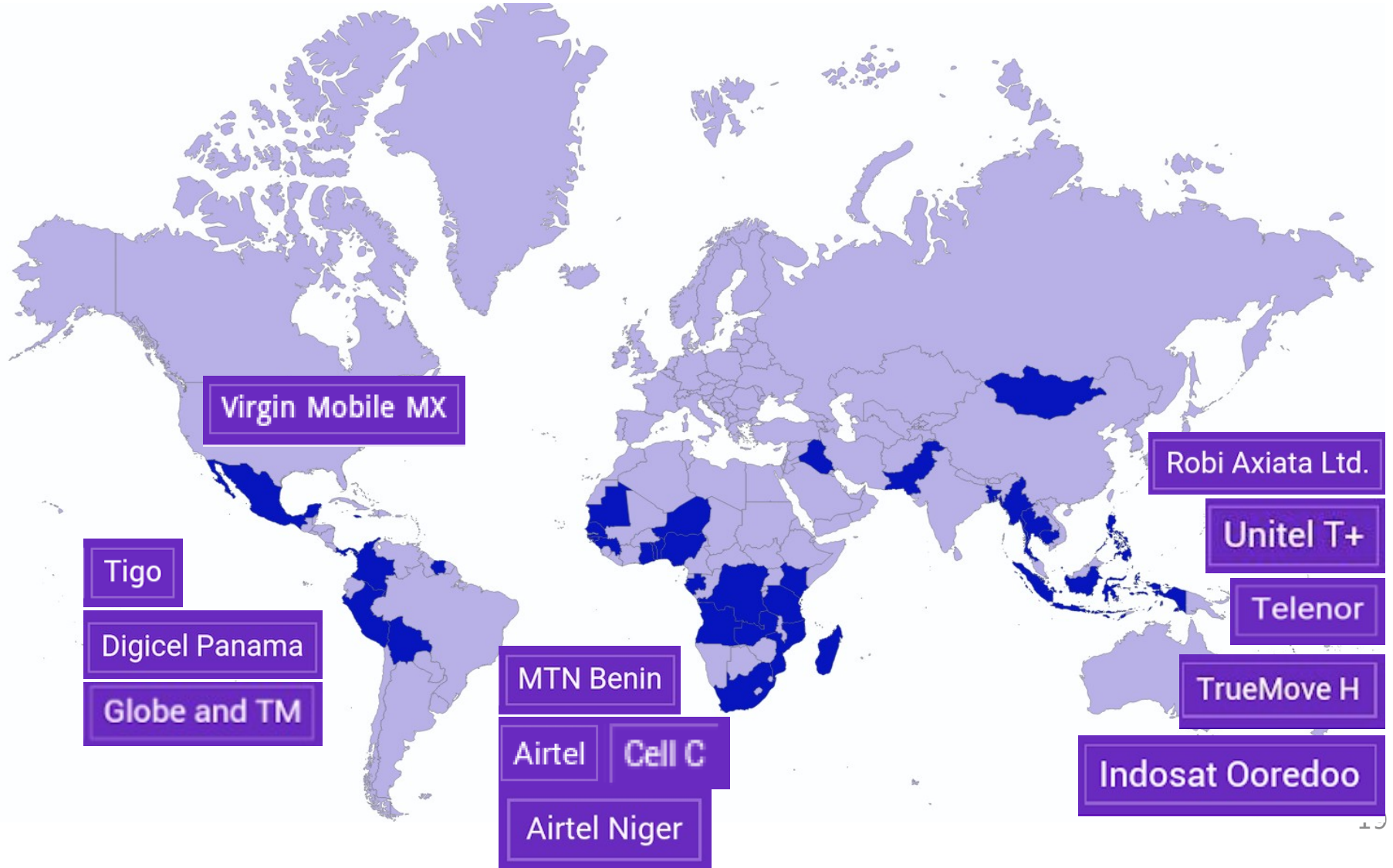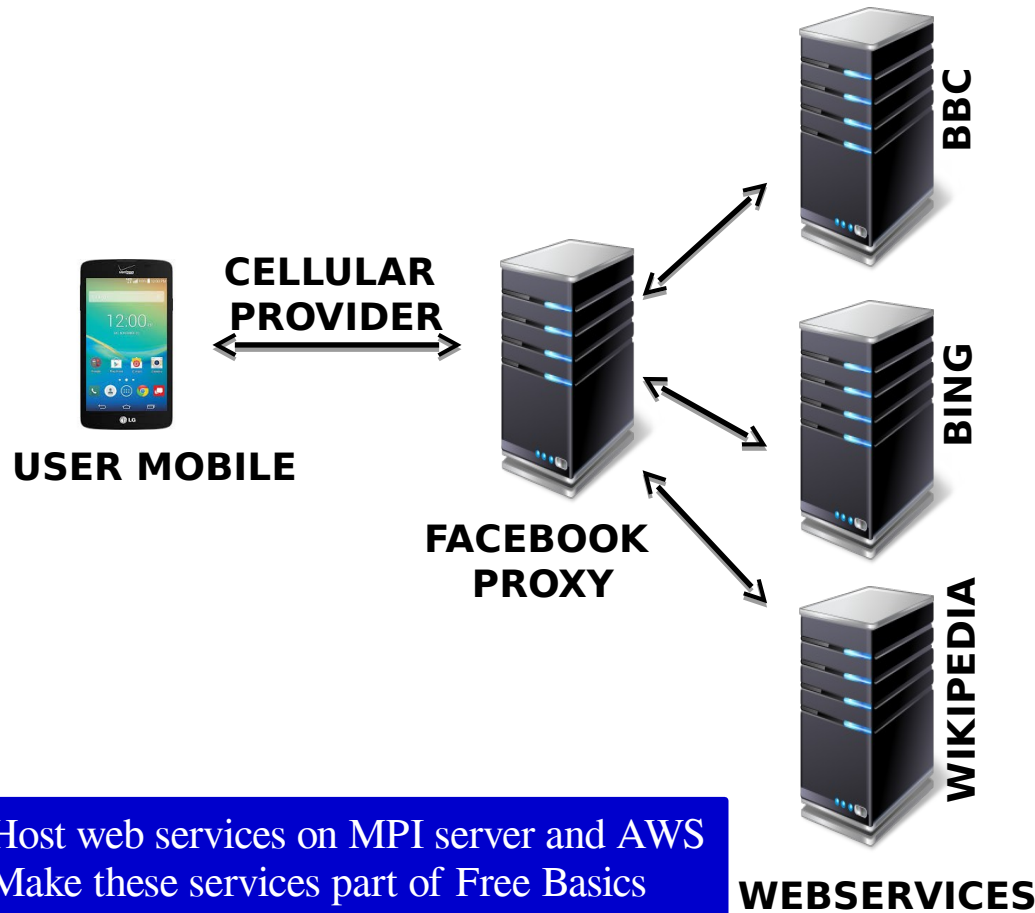
Measurement needs to be in specific countries, with particular cellular connections.

Virgin Mobile MX

Robi Axiata Ltd.

Unitel T+

Tigo

Telenor

Digicel Panama

Globe and TM

TrueMove H

MTN Benin

Airtel   Cell C

Indosat Ooredoo

Airtel Niger

Measurement Methodologies

CELLULAR PROVIDER

USER MOBILE

FACEBOOK PROXY

BBC

BING

WIKIPEDIA

WEBSERVICES

- Host web services on MPI server and AWS
- Make these services part of Free Basics

& our audit questions

Doesn't this give Facebook censorship rights?

How does Facebook's gatekeeping for Free Basics services work?

Our Services

Took 1-2 weeks from application to going live, feedback was all technical (remove Javascript).

Our Services

Took 1-2 weeks from application to going live, feedback was all technical (remove Javascript).

LEARN BASICS

The purpose of this website is to provide free learning resources. It is specifically tailored for developing world and people accessing the Internet through Facebook's Free Basics service. As a result, we aim to focus more on textual resources instead of audio and video lectures.

Click the following link to browse through the available list of resources. Each topic has a set of PDF files, which can be read in your mobile browser. You can also download them for offline reading.

We noticed that opening or downloading PDF files is not free in Free Basics. So in addition to the PDF option, we have provided an HTML version of each PDF file. The HTML can be read for free in the mobile browser.

Offered in English since Jul 2, 2016.

Our Services

LEARN BASICS

The purpose of this website is to provide free learning resources. It is specifically tailored for developing world and people accessing the Internet through Facebook's Free Basics service. As a result, we aim to focus more on textual resources instead of audio and video lectures.

Click the following link to browse through the available list of re-sources. Each topic has a set of PDF files, which can be read in your mobile browser. You can also download them for offline reading.

We noticed that opening or downloading PDF files is not free in Free Ba-sics. So in addition to the PDF option, we have provided an HTML version of each PDF file. The HTML can be read for free in the mobile browser.

The News Bugle

Home   Personalize   Community Suggestions   About

World News

World News

Trump warns North Korea: 'Do not try us'
Source: CNN
Wed, 08 Nov 2017 05:25:44 GMT

— Standing near the front line of the world's tensest standoff, President Donald Trump on Wednesday issued a direct and personal warning to North Korean dictator Kim Jong Un, declaring during his first major speech in Asia that continued nuclear provocation could result in the communist nation's obliteration.

Africa

Asia

Americas

Offered in English since Jul 2, 2016.

Offered in English since Sep 17, 2016, in Spanish and French since Dec 16, 2016.

Our Services

LEARN BASICS

The purpose of this website is to provide free learning resources. It is specifically tailored for developing world and people accessing the Internet through Facebook's Free Basics service. As a result, we aim to focus more on textual resources instead of audio and video lectures.

Click the following link to browse through the available list of re-sources. Each topic has a set of PDF files, which can be read in your mobile browser. You can also download them for offline reading.

We noticed that opening or downloading PDF files is not free in Free Basics. So in addition to the PDF option, we have provided an HTML version of each PDF file. The HTML can be read for free in the mobile browser.

Home   Personalize   Community Suggestions   About

World News

World News

Trump warns North Korea: 'Do not try us'
Source: CNN
Wed, 08 Nov 2017 05:25:44 GMT
— Standing near the front line of the world's tensest standoff, President Donald Trump on Wednesday issued a direct and personal warning to North Korean dictator Kim Jong Un, declaring during his first major speech in Asia that continued nuclear provocation could result in the communist nation's obliteration.

Africa
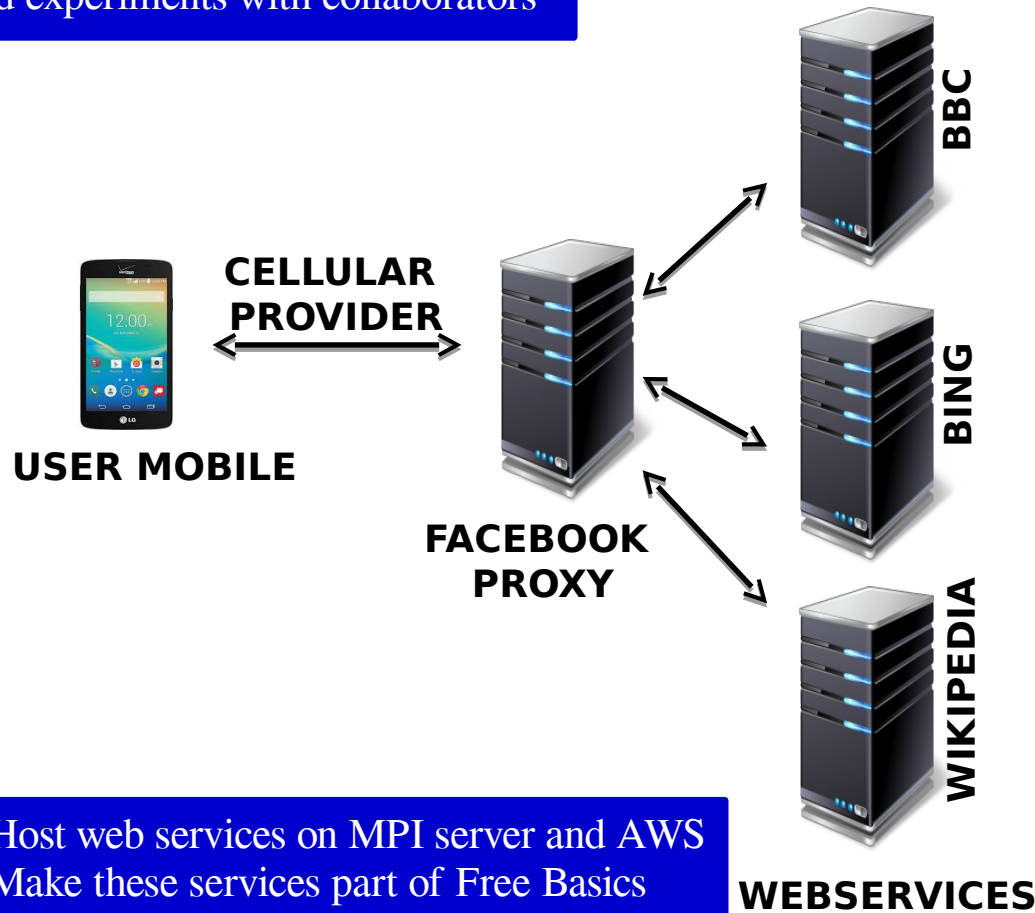
Asia

Offered in English since Jul 2, 2016.

Offered in English since Sep 17, 2016, in Spanish and French since Dec 16, 2016.

Learn Basics has static content, suitable for repeatable networking experiments.
Bugle News is dynamic, with potential to attract more users. That is suitable for user analysis.

Measurement Methodologies

- Controlled experiments with collaborators

BBC

CELLULAR PROVIDER

USER MOBILE

FACEBOOK PROXY

BING

WIKIPEDIA

- Host web services on MPI server and AWS
- Make these services part of Free Basics
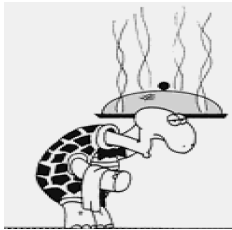
WEBSERVICES

Measurement Methodologies

- Controlled experiments with collaborators

- Participant recruitment in 15 countries
- Android app to crawl Free Basics webpage
- Collection of service lists across months
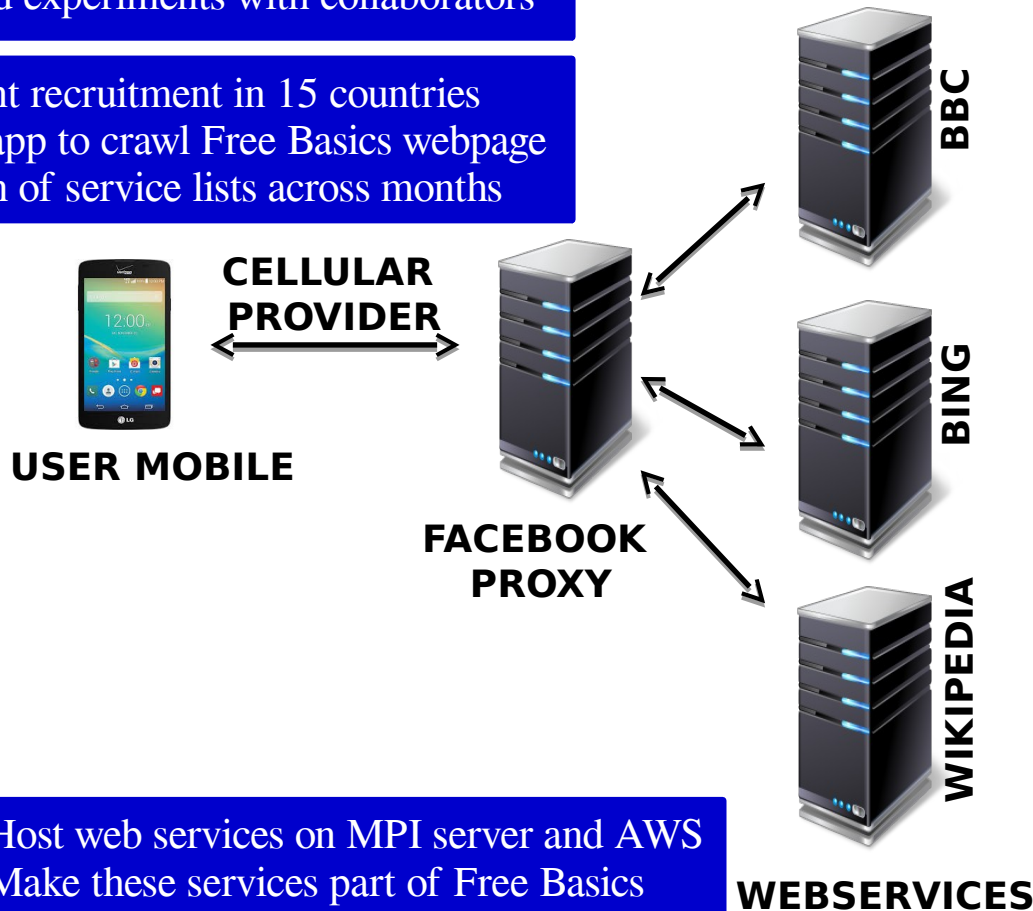
USER MOBILE

CELLULAR PROVIDER

FACEBOOK PROXY

BBC

BING

WIKIPEDIA

WEBSERVICES

- Host web services on MPI server and AWS
- Make these services part of Free Basics

& our audit questions

Won't non-free services be at an economic disadvantage?

Does this net-nutrality question need more nuance?
Should we ask the question: *"Free, but at what cost?"*
How is network QoS for the free services, compared to non-free?

Observed network QoS differences

BBC and Cricinfo, normal and Free Basics versions, repeatedly crawled under same conditions.

Observed network QoS differences
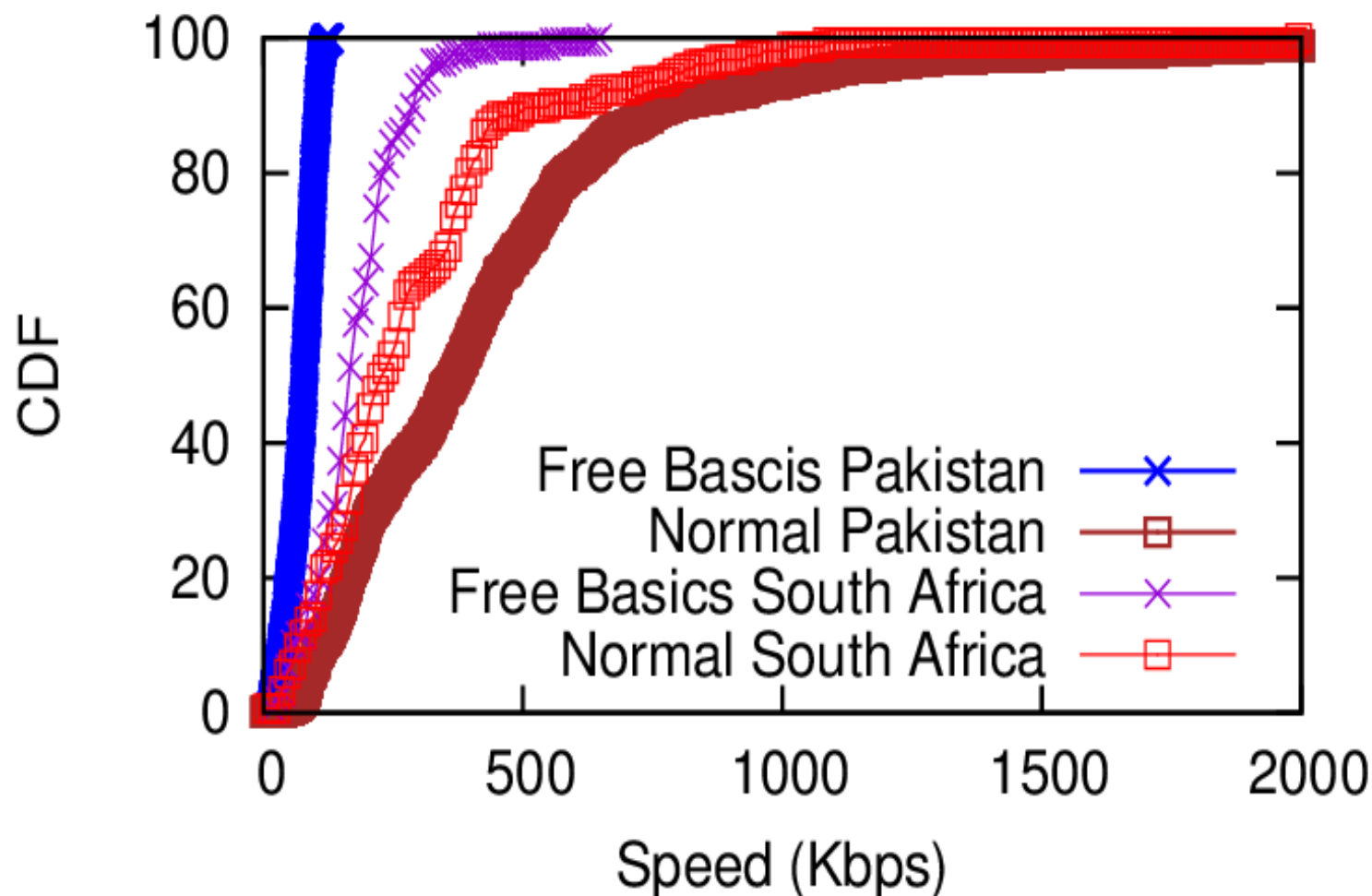
Root Cause 1: Network Path Inflation

Root Cause 1: Network Path Inflation

Network Entity	Geographical Locations
Mobile Clients	Pakistan, South Africa
Web-Servers	Germany, Virginia, Sao Paolo, Mumbai, Tokyo, Sydney

Root Cause 1: Network Path Inflation

| Network Entity	Geographical Locations
Mobile Clients	Pakistan, South Africa
Web-Servers	Germany, Virginia, Sao Paolo, Mumbai, Tokyo, Sydney
FB C-proxy	London (primary for SA), Frankfurt (primary for PK), Marseille, Paris, Singapore, Los Angeles
FB S-proxy	Lulea (Sweden), Prineville OR (USA)

Root Cause 1: Network Path Inflation

Network Entity	Geographical Locations
Mobile Clients	Pakistan, **South Africa**
Web-Servers	Germany, **Virginia**, Sao Paolo, Mumbai, Tokyo, Sydney
FB C-proxy	**London (primary for SA)**, Frankfurt (primary for PK), Marseille, Paris, Singapore, Los Angeles
FB S-proxy	**Lulea (Sweden)**, Prineville OR (USA)

Root Cause 1: Network Path Inflation

Network Entity	Geographical Locations
Mobile Clients	Pakistan, **South Africa**
Web-Servers	Germany, **Virginia**, Sao Paolo, Mumbai, Tokyo, Sydney
FB C-proxy	**London (primary for SA)**, Frankfurt (primary for PK), Marseille, Paris, Singapore, Los Angeles
FB S-proxy	**Lulea (Sweden)**, Prineville OR (USA)

Root Cause 2: Throttling

Root Cause 2: Throttling

Choose mobile client (PK), web server (Germany) -> FB C proxy (Frankfurt), FB S proxy (Sweden)

Root Cause 2: Throttling

Root Cause 2: Throttling

Choose mobile client (PK), web server (Germany) -> FB C proxy (Frankfurt), FB S proxy (Sweden)

FRB and NFRB clients differ
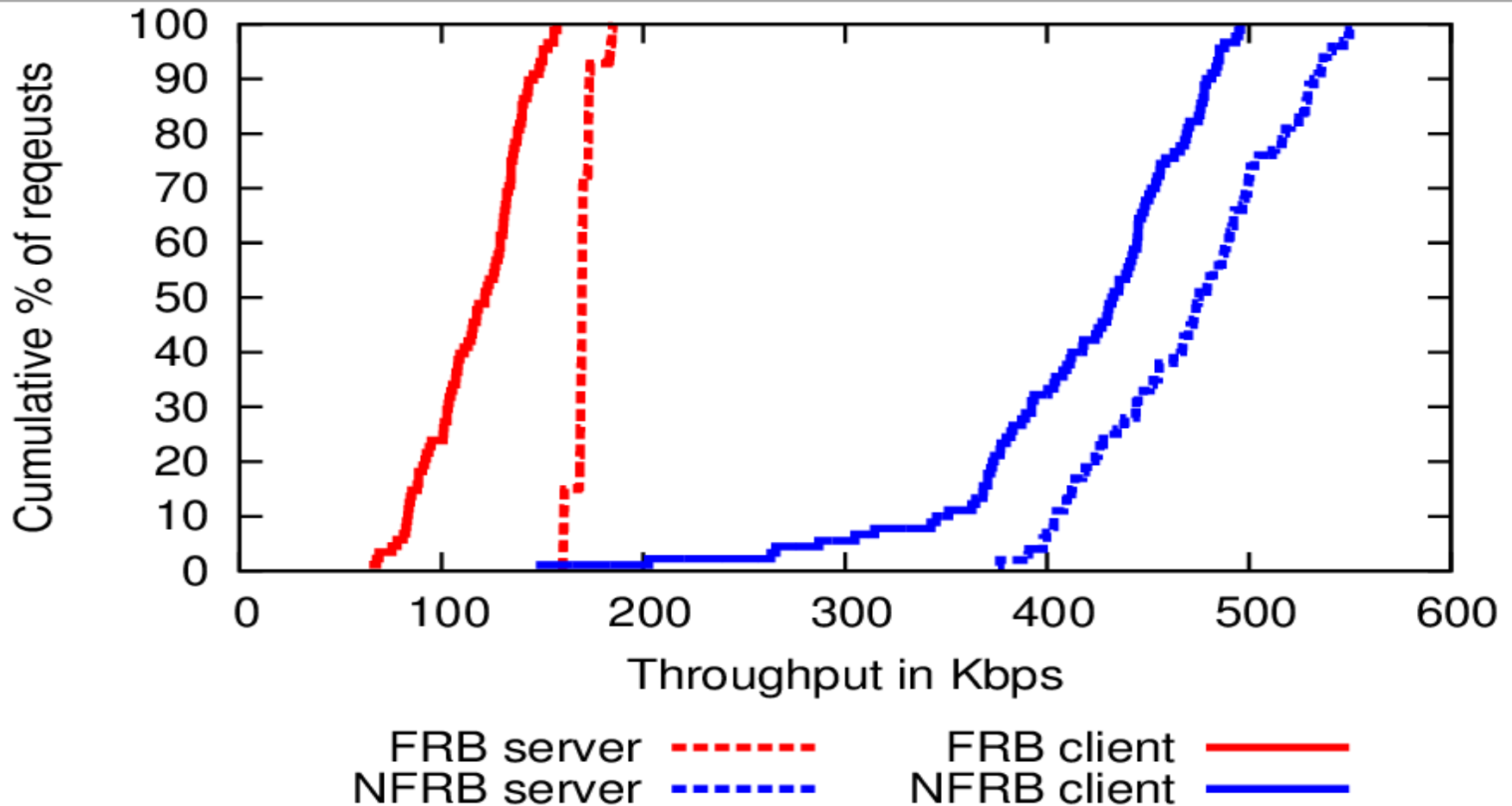
FRB server ------
NFRB server ------
FRB client ——
NFRB client ——
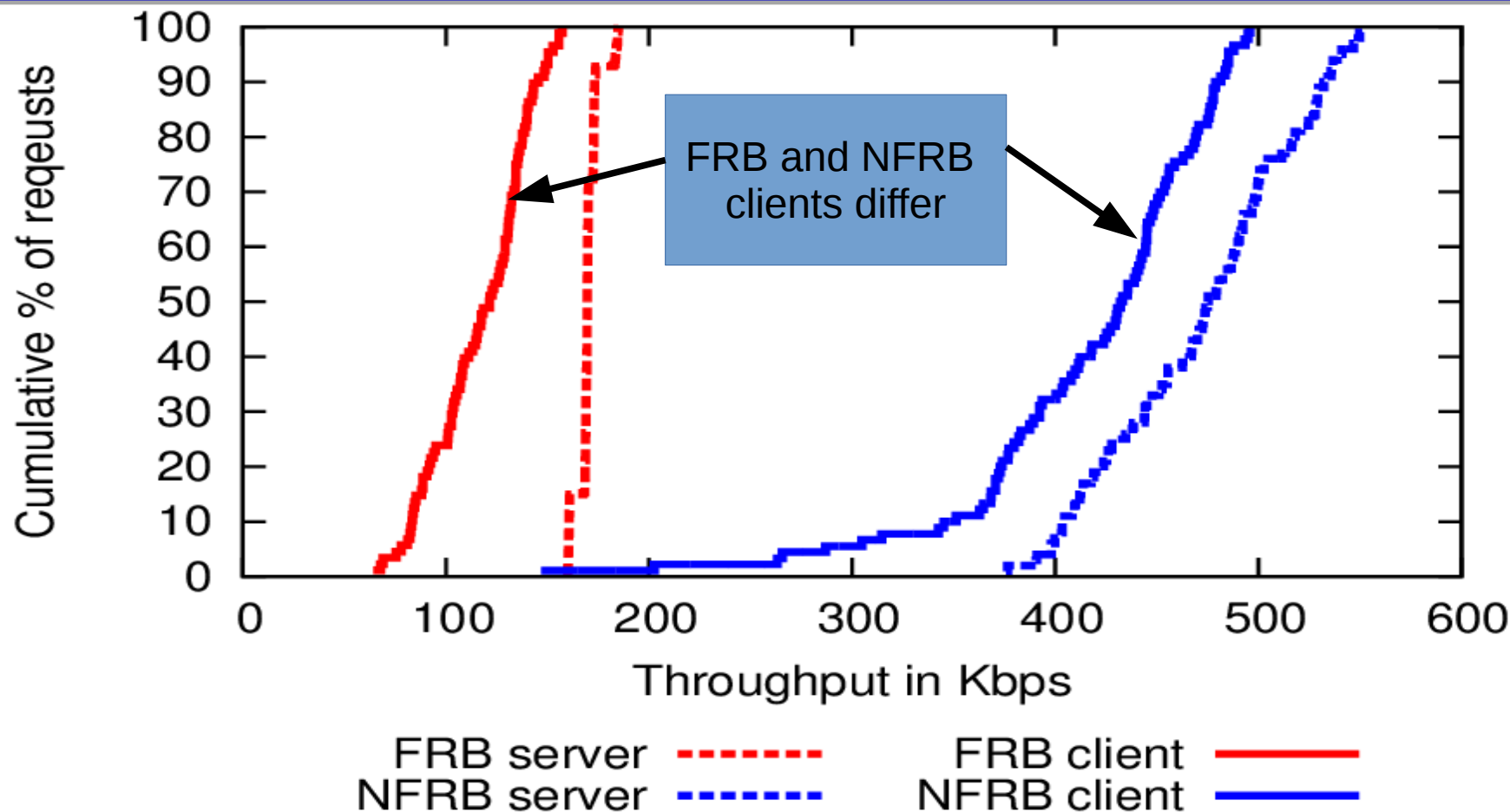
We have seen this before with BBC and Cricinfo.
The direct and proxy path latency differences are insignificant for this experiment, so something else is at work.

Root Cause 2: Throttling

Choose mobile client (PK), web server (Germany) -> FB C proxy (Frankfurt), FB S proxy (Sweden)

FRB and NFRB servers differ
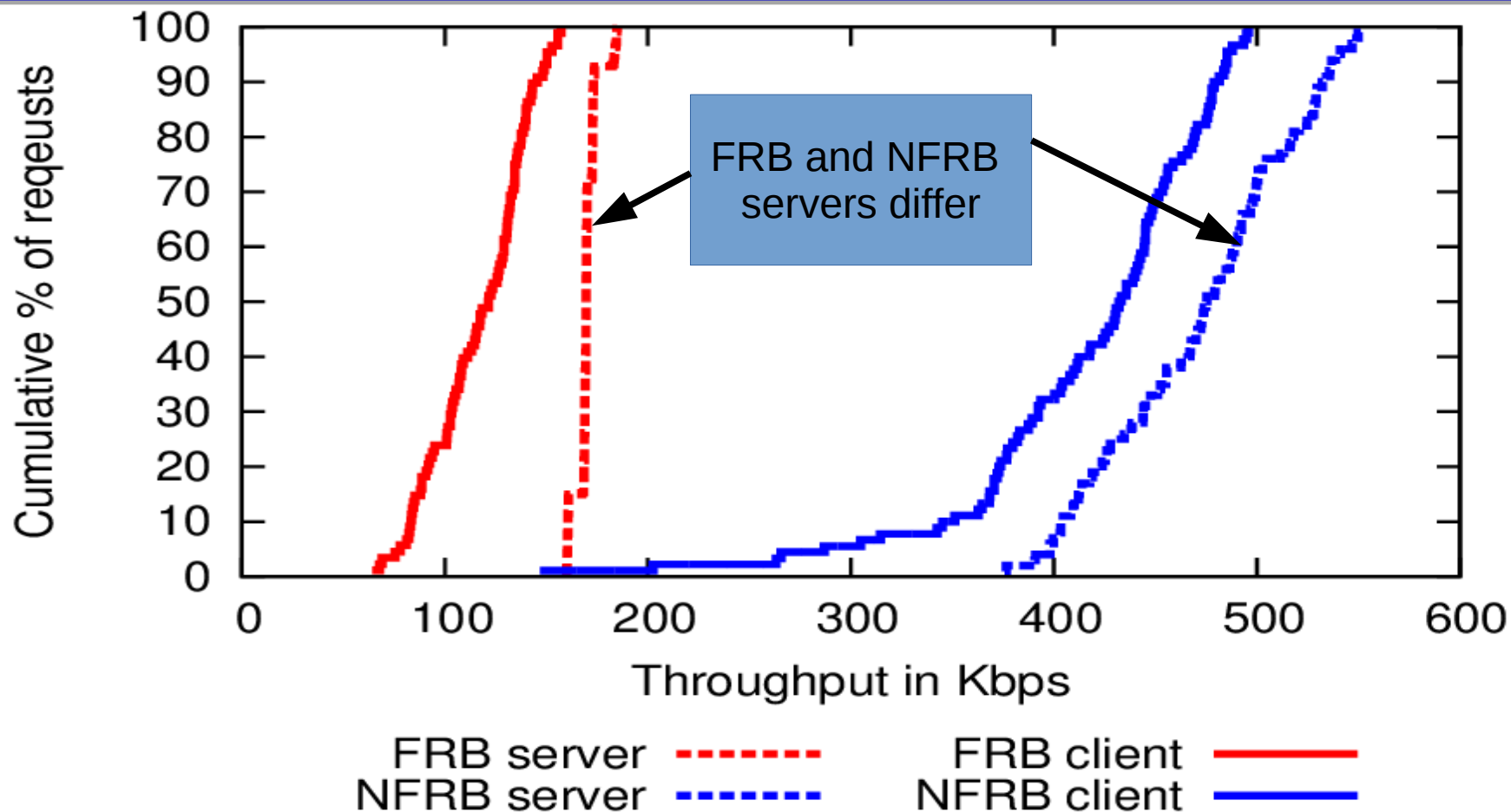
FB S-proxy seems to self-throttle itself at 150 Kbps,
while the NFRB throughput peaks at 550 Kbps.

Root Cause 2: Throttling

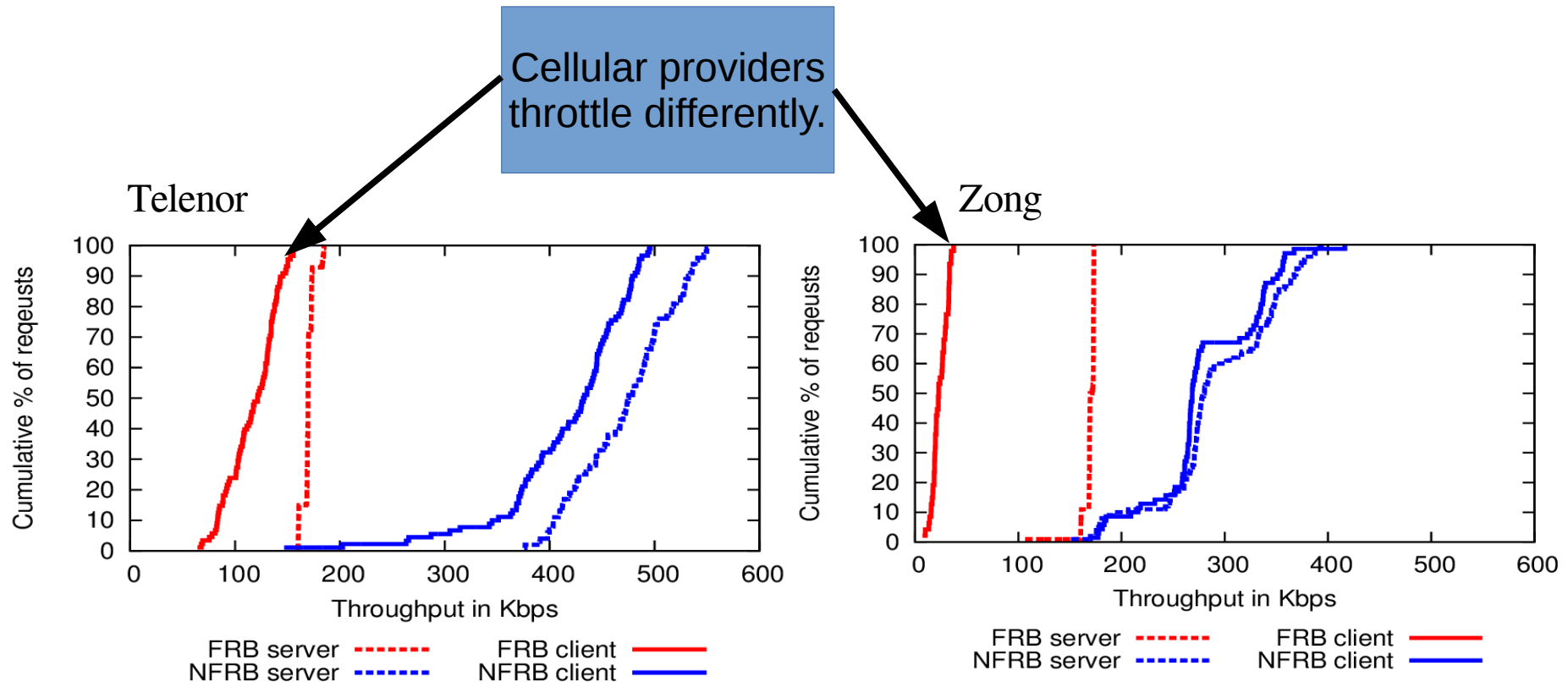Choose mobile client (PK), web server (Germany) -> FB C proxy (Frankfurt), FB S proxy (Sweden)
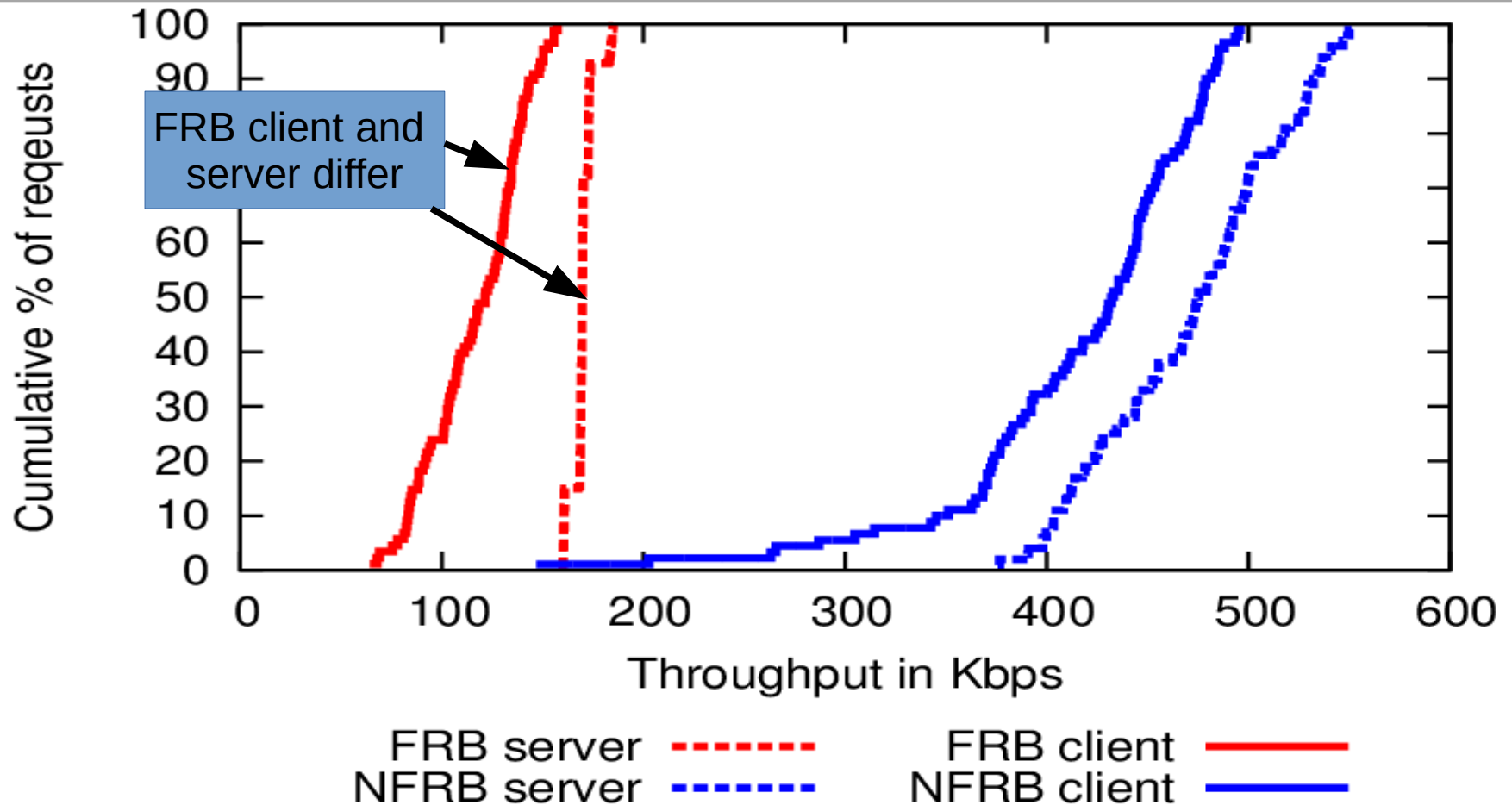
FB C-proxy further throttles throughput to 120 Kbps.

Root Cause 2: Throttling

Choose another cellular provider in Pakistan, Zong in addition to Telenor.

Root Cause 2: Throttling

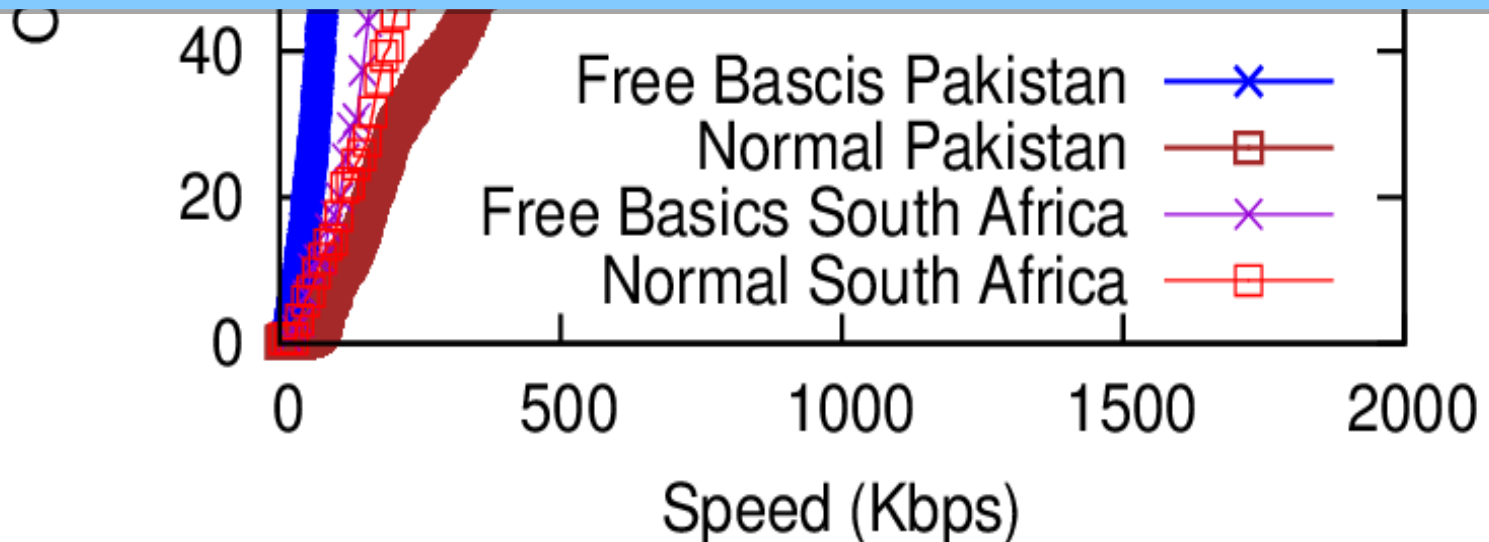Choose another cellular provider in Pakistan, Zong in addition to Telenor.

Client-side median throughputs are 120 Kbps for Telenor and only 20 Kbps for Zong.

Observed network QoS differences

BBC and Cricinfo, normal and Free Basics versions, repeatedly crawled under same conditions.
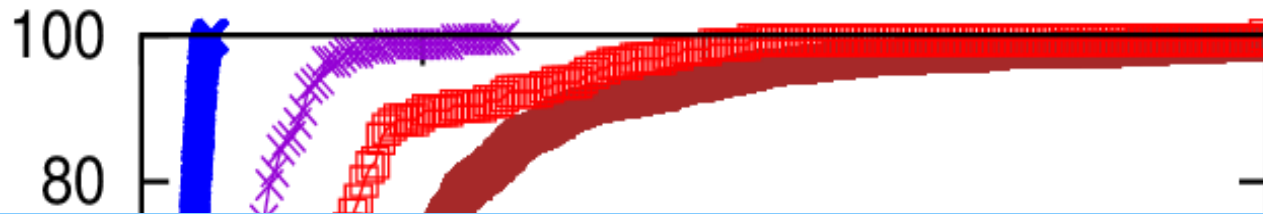
Due to network path inflation and
throttling (both at Facebook server and at the cellular provider),
Free Basics network QoS is worse than the paid equivalent.

Free Bascis Pakistan ──×──
Normal Pakistan ──□──
Free Basics South Africa ──×──
Normal South Africa ──□──

Speed (Kbps)

& our audit questions

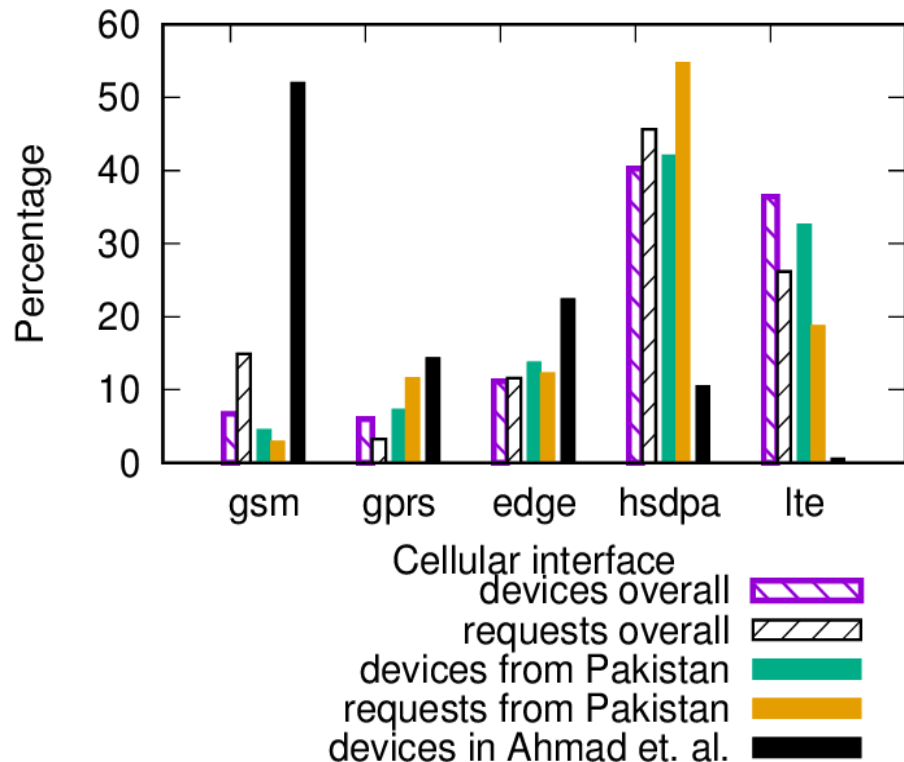Are the poor using this, as claimed by Facebook?

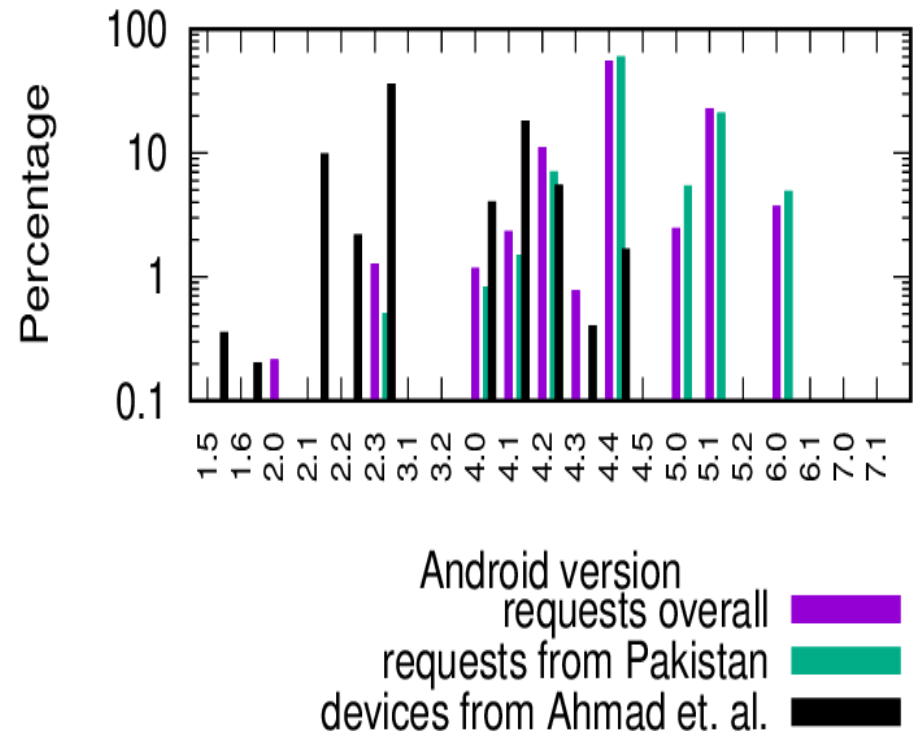What demographics, interests and phones do the visitors have?
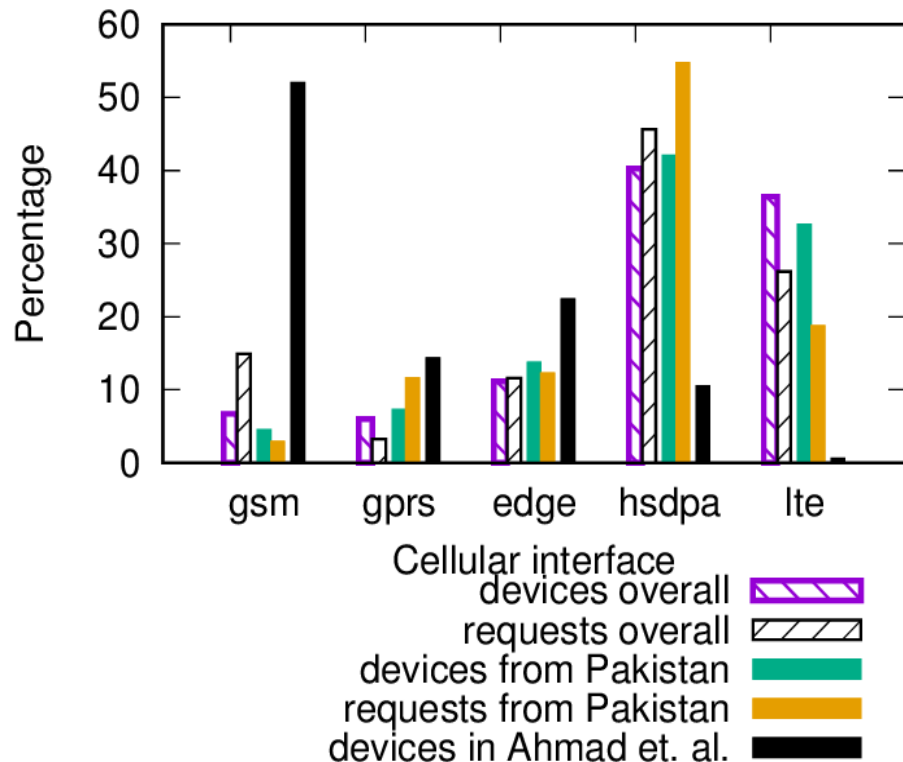
Who are the visitors?

Analyzed user agent strings in HTTP requests at our server.
Compared Pakistan requests with a cellular privider dataset from collaborator.

Who are the visitors?
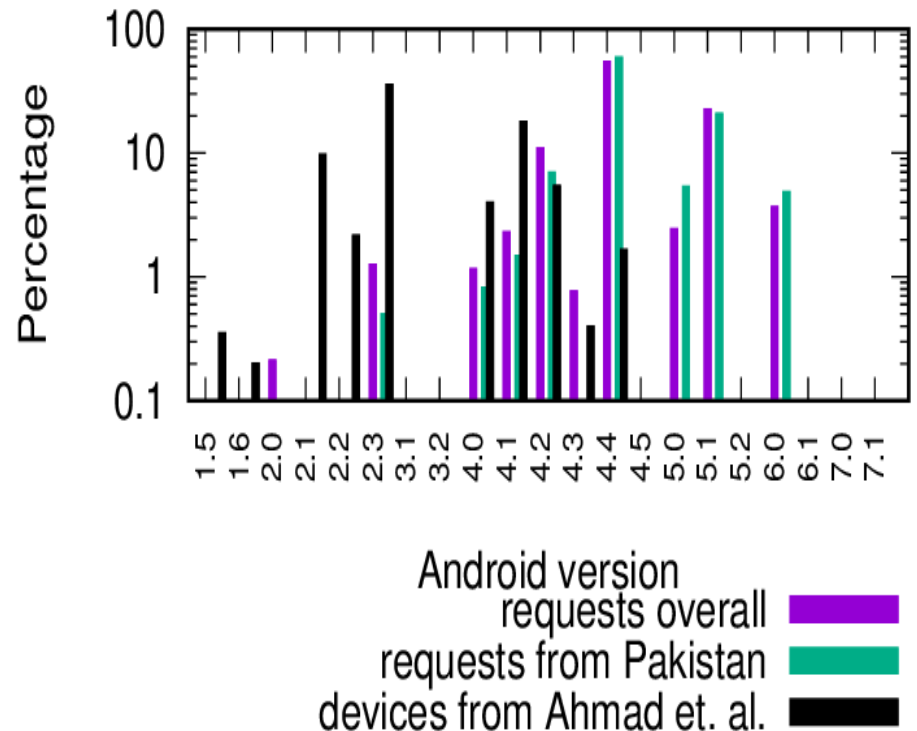
Who are the visitors?

Analyzed user agent strings in HTTP requests at our server.
Compared Pakistan requests with a cellular privider dataset from collaborator.

Device distribution does not match that from collaborator. We see more high end devices.
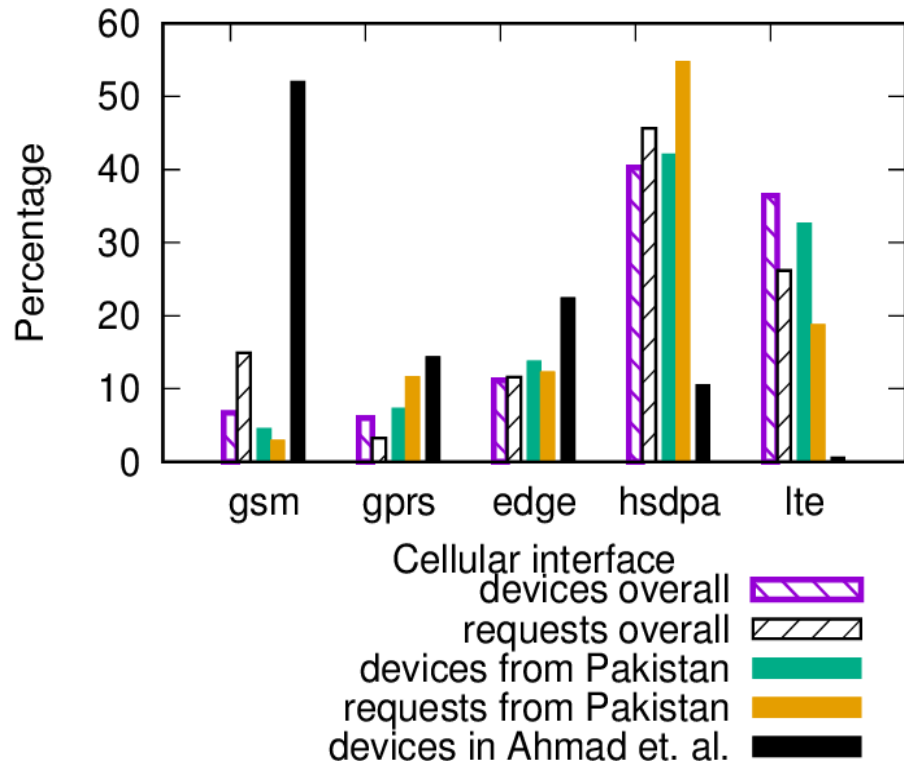But low end are also there.
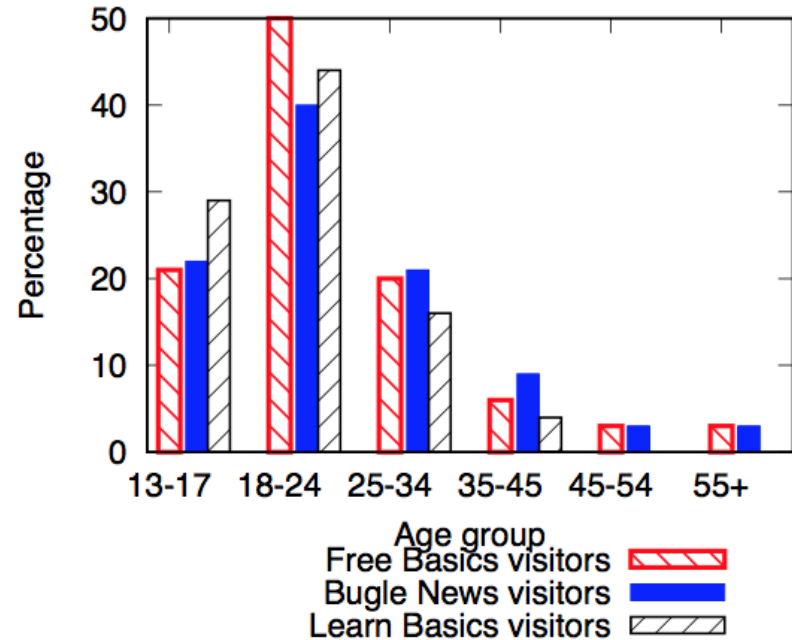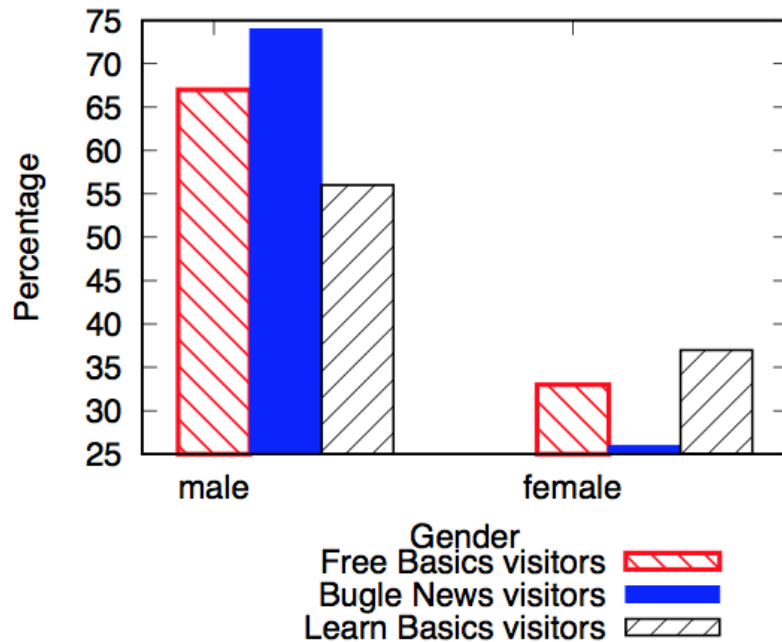
Who are the visitors?

Analyzed user agent strings in HTTP requests at our server.
Compared Pakistan requests with a cellular privider dataset from collaborator.
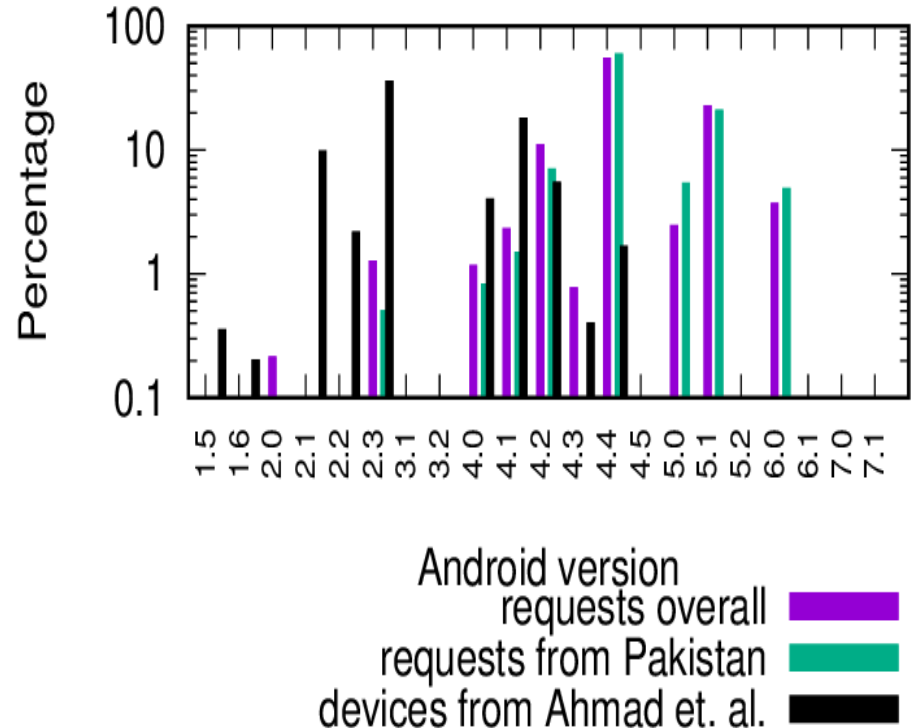
Device distribution does not match that from collaborator. We see more high end devices. But low end are also there.
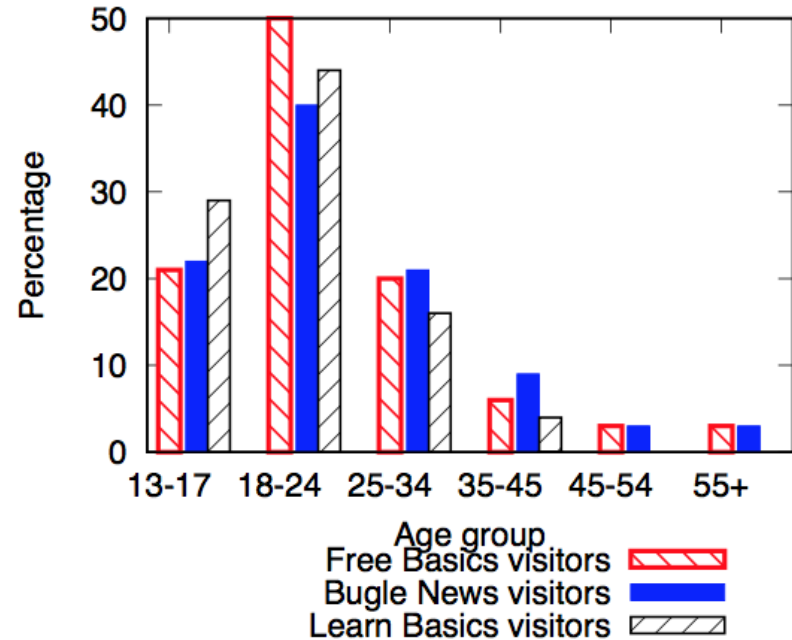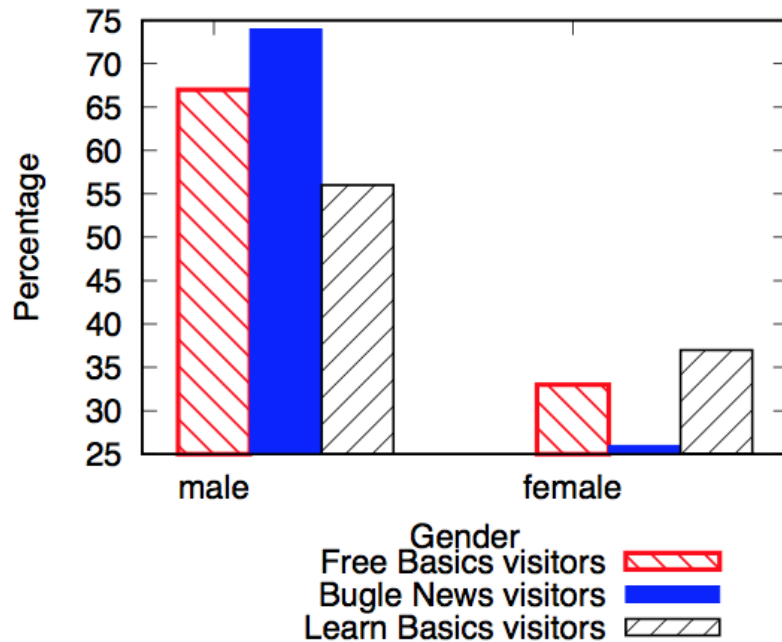
Romanosky, J. and Chetty, M. (2018) 'Understanding the Use and Impact of the Zero-Rated Free Basics Platform in South Africa'. CHI 2018.

Who are the visitors?

Demographics of Free Basics users on Bugle News as shown on Free Basics developers' portal.

Who are the visitors?

Demographics of Free Basics users on Bugle News as shown on Free Basics developers' portal.

More interesting than the statistics, is how does the Free Basics developers' portal show this information? Neither Free Basics nor our services need any entry of age/gender information.

From where is this inferred (Facebook account of the users)?
Are there some data privacy implications? Should there be more transparency about data usage?
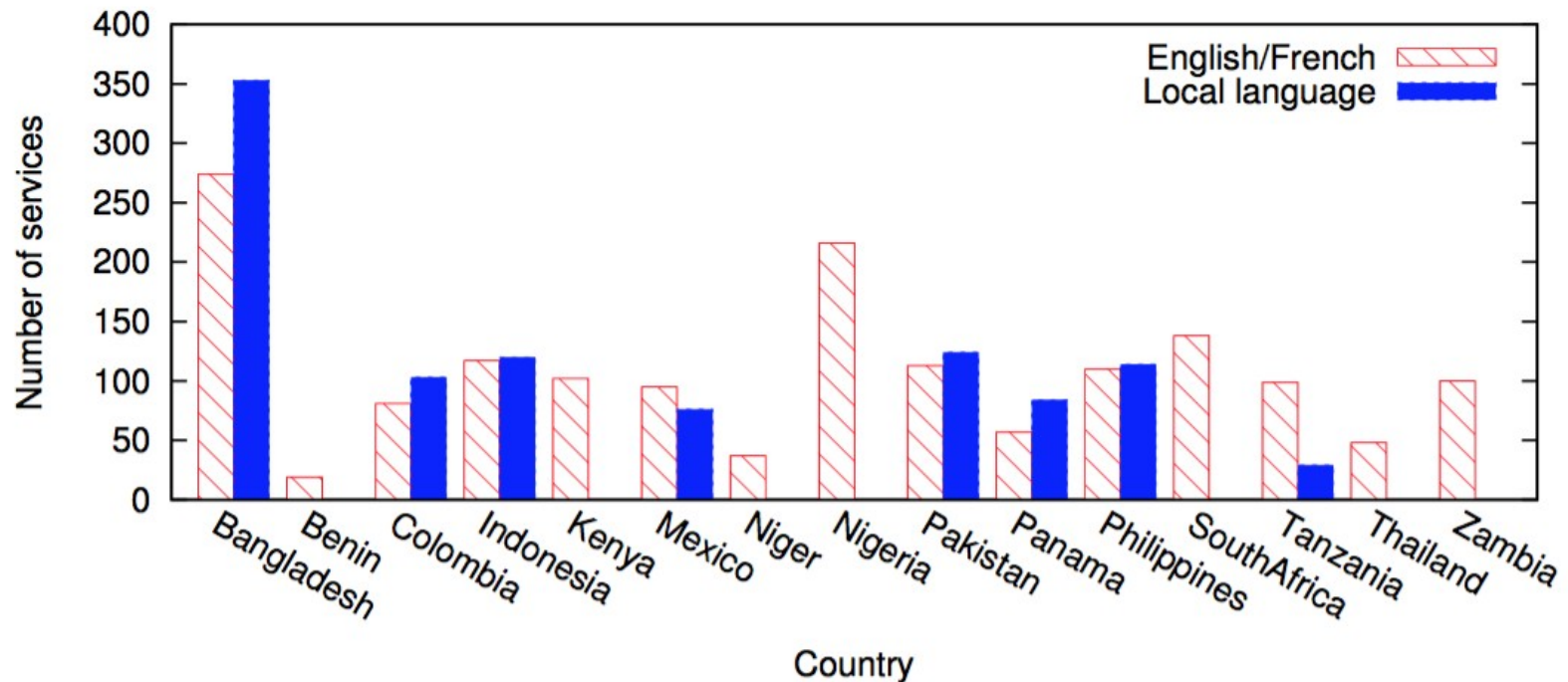
FREE FOOD & our audit questions

Is this just a hype?

What services are there? Are they growing over time?

Is this just a hype?

Number of services

Deployed services are highly customized in each country, with 80% of the observed services offered only in one country. Possibly proportional with local developer activity.

Is this just a hype?

Growth of Services
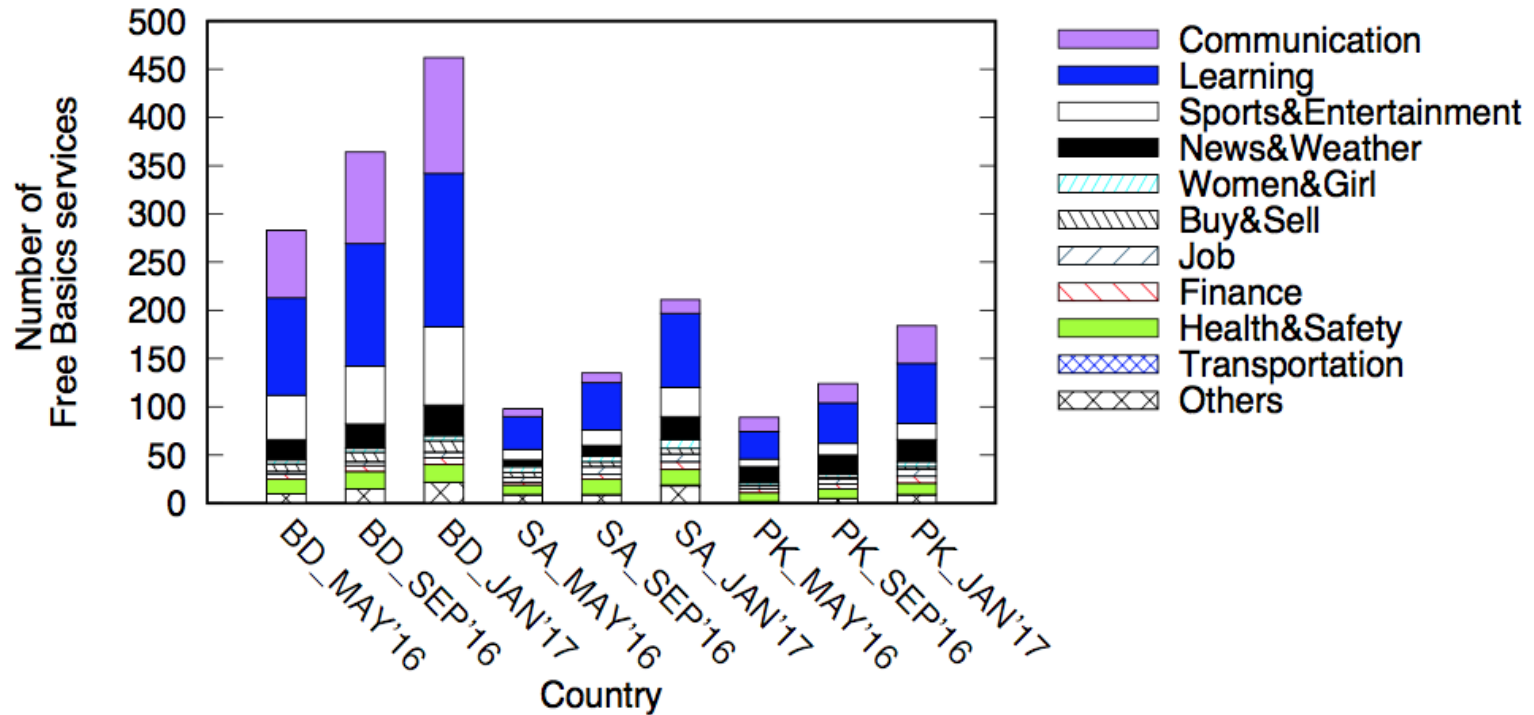
- Services grew rapidly, dominated by information services in education, news, and health.
- Between the nine months of May 2016 to January 2017, Bangladesh has added 179 new services, while South Africa has added 113 and Pakistan 95.

Is this just a hype?

Free Basics users on Bugle News.

Bugle News attracted 95.6K unique visitors between Sep 2016 and 2017 without any promotion.

Is this just a hype?

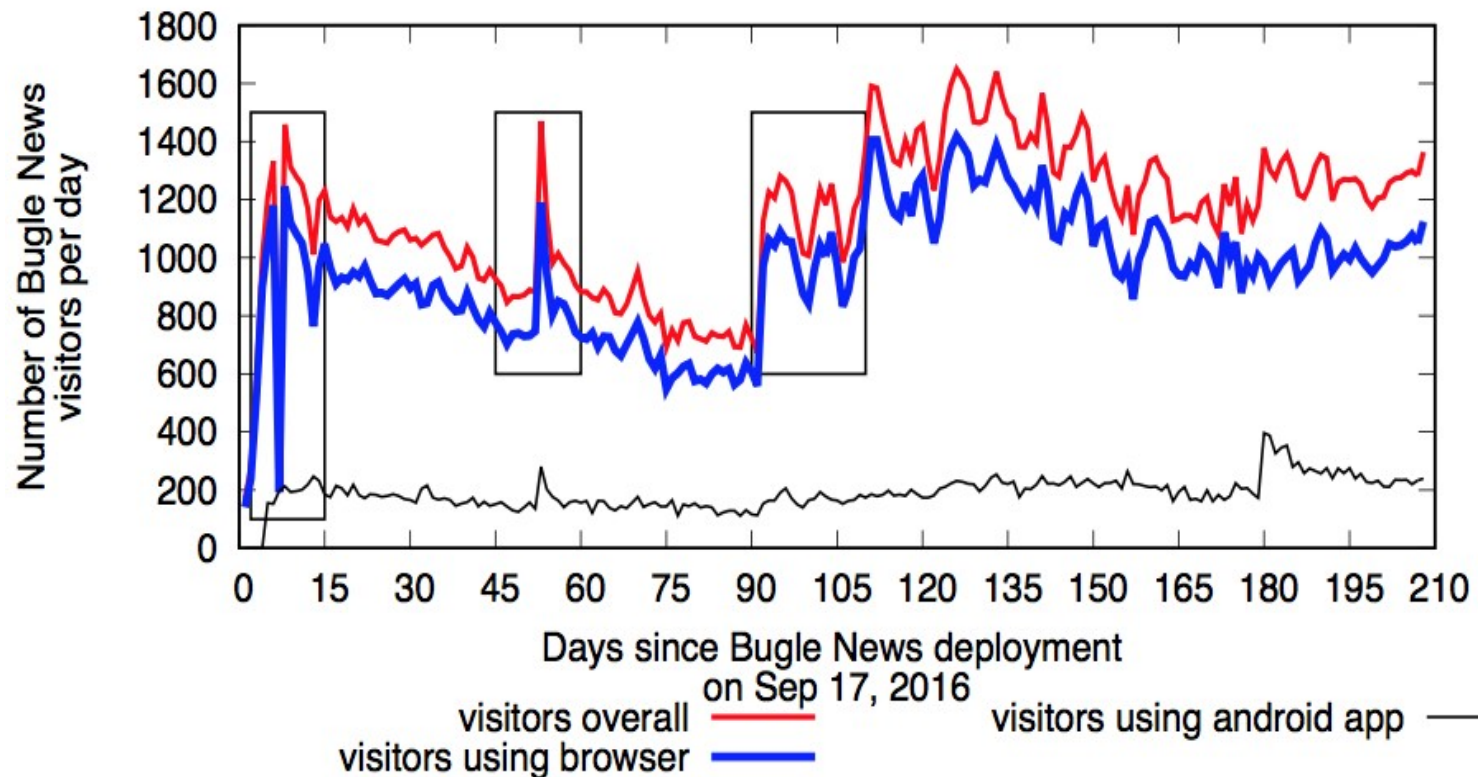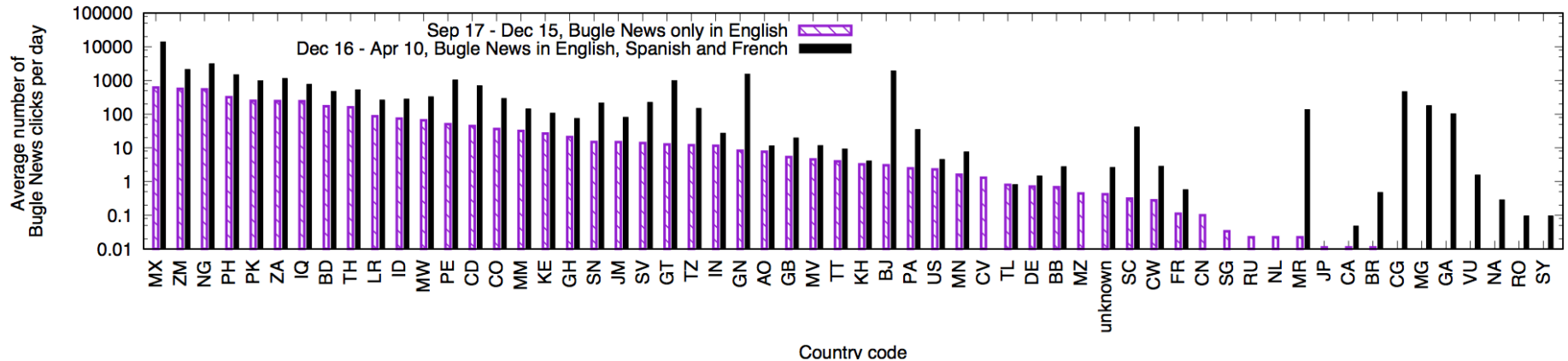Country of Free Basics users on Bugle News.

- Bugle News has received visitors from 56 countries so far.
- Mexico(MX), Zambia (ZM), Nigeria (NG), Philippines (PH), Pakistan (PK), South Africa (ZA), Iraq (IQ), Bangladesh (BD) and Thailand (TH) are some of the countries with highest number of requests per day

Emboldened by these observations, we offered our third Free Basics service to create new information …..

Awaaz: an ICTD service

Report an issue
Fields marked with * are compulsory
Location: Bitou , South Africa

Town * :
Bitou NU
Category * :
Roads
Title * :
Description * :

Full address:

Image (should be less than 100KB in size):
Enter the text as shown in the image in the box below * :

Report

Crowd-sourcing information about civic issues in developing countries.

Currently active in South Africa.

Includes a link where users can see issues reported so far, categorized by topics or by location.

Option to add comments, so that users can reinforce, negate or discuss issues reported by others.

Awaaz: an ICTD service

Road

Location, **Title:** Description
Cederberg, Cederberg NU, **terrible roads:** in chatty we hv a issue of our gravel road whn it rains its a disaster and tht makes it impossible for vehicles to pass bcz the others get stuck and this grauel road is the main road we really do need help wit this thnk you
Emakhazeni, Belfast, **Mr:** Roads at Belfast have a lot of potholes.

Water

Location, **Title:** Description
City of Johannesburg, Roodepoort, **mr dn mothibi:** I Dikabelo Mothibi residing at georginia Roodepoort. My complain is the place we stay at. we don't have water. Landlord she stole electricity. room leaking when it raining my furniture it get wet. I loose my job because it was raining then I been absent at work. to protect my furniture. I need help pls. My contact number is xxxxxxxxx. *This issue has been reported three times.*
Polokwane, Polokwane, **help us with water:** Our people can spend two to three months without water and this is bad because some of our people have to buy water from people who have boreholes in their homes.there are those who have water tanks in their homes and their water can last longer,so those with no water tanks suffer a lot because sometimes they don'nt have enough money to buy water,water tanks or bore their own boreholes.

Electricity

Location,**Title:** Description
Uphongolo, Rosendal, **Bridged electricity:** We have a problem of people who bridged electricity ,there are lot of them and now electricity bill is high on people who did not bridge
Mafikeng, Majemantsho, **shutting down off the electricity without a notice:** Mine we experience shutt down of electricity continuously about 2 days in very week.This affect us in a way that our goods are being waisted because they use electricity.school children are can't go to school because its winter now they can't bath with cold water and crime rate is high.
City of Johannesburg, Johannesburg, **we need electric in our community:** Plz someone help us coz we don't get service delivery in our community since from 1991 I was born here but every counsellor come with empty promises

- 94 unique issues reported between March and September, 2017.
- All issues on http://myvoice.mpi-sws.org/all_reports

FREE FOOD & empirical audit based answers

& empirical audit based answers

Doesn't this give Facebook censorship rights?

Facebook gate-keeping was purely technical for our three services.

& empirical audit based answers

Doesn't this give Facebook censorship rights?

Facebook gate-keeping was purely technical for our three services.

Won't non-free services be at an economic disadvantage?

Network QoS is too poor for interactive, feature rich services.
They should remain outside Free Basics, ensuring privacy from Facebook.
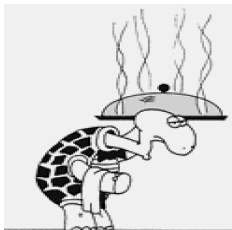
& empirical audit based answers

Doesn't this give Facebook censorship rights?

Facebook gate-keeping was purely technical for our three services.

Won't non-free services be at an economic disadvantage?

Network QoS is too poor for interactive, feature rich services.
They should remain outside Free Basics, ensuring privacy from Facebook.

Are the poor using this, as claimed by Facebook?

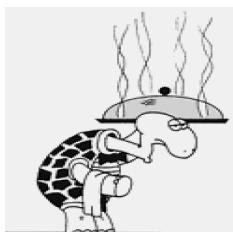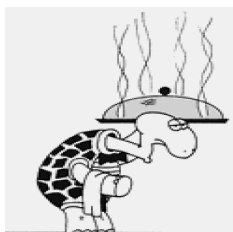Both high and low end phones. Opaque on user information privacy.

& empirical audit based answers

Doesn't this give Facebook censorship rights?

Facebook gate-keeping was purely technical for our three services.

Won't non-free services be at an economic disadvantage?

Network QoS is too poor for interactive, feature rich services.
They should remain outside Free Basics, ensuring privacy from Facebook.

Are the poor using this, as claimed by Facebook?

Both high and low end phones. Opaque on user information privacy.

Is this just a hype?

Rich eco-system of local developers creating locally relevant content.
Millions of visitors from all developing countries.

Unfortunately, the debates had no empirical grounding

Facebook's Free Basics service has been banned in India

The country has said no to zero-rating schemes

By James Vincent | @jjvincent | Feb 8, 2016, 6:22am EST

Facebook lures Africa with free internet - but what is the hidden cost?

Some see Mark Zuckerberg's plan to wire up the continent as a philanthropic gesture, others suspect a cynical marketing ploy

▲ Facebook chairman Mark Zuckerberg has said access to the internet is a 'bas...

WILL TELECOM REGULATOR GIVE FACEBOOK A FREE HAND?

OpenMedia is a community-based organization that safeguards the possibilities of the open Internet.

ATTN: Mark Zuckerberg, Chairman and CEO, Facebook
CC: Kevin Chan, Head of Public Policy, Canada, Facebook

Re: Opening Internet.org and Free Basics

OpenMedia and our supporters around the world are gravely concerned with the discriminatory practices of Facebook's Free Basics platform (previously called "Internet.org"). Many of the concerns raised in the *Open Letter to Mark Zuckerberg Regarding Internet.org, Net Neutrality, Privacy, and Security* sent from OpenMedia and nearly 70 other organizations from 31 countries have yet to be adequately addressed. Since the letter was published, we have engaged over 60,000 Internet users from around the world through our *No Fake Internet* campaign, and, recently, ran a large *billboard* near your head office in Palo Alto, California.

66