

Make it available Offline:
**Digital divide, censorship, and application
performance**

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(case study)

The digital divide



isn't going to bridge itself.

Big thanks to
goto; Trifork
(Maria Wennestam
+ the rest of the
team)

&&
goto; Booth #7

fair

Why this talk?

We should *talk* more about offline stuff!

3 aspects of offline

- Offline for education
- Offline against censorship
- Offline for application performance
- Coming soon:
 - Offline for your soul and mental health

Survey \o/

My Background

- Working with computer projects since 2009 as a volunteer in FAIR
 - Computer reuse and refurbishment
 - ...for secondary education in Malawi
- Educational content
- As a software and community developer at Learning Equality
 - Khan Academy offline (KA Lite)
 - Kolibri

The Digital Divide

- *Something we wanna bridge*
- Division in access to digital technology, services etc.
- ICT = A tool
 - ...to gain knowledge => Knowledge Divide
- **ICT4D** (ICT = Information and Communication Technology, 4D = For Development)

Education: The digital divide

- Most people don't have an Internet connection
- Estimates
 - Around 40% of the world population has an Internet connection today (<http://www.internetlivestats.com>)
- **Access to education increasingly becomes a question of access to ICT (and Internet!)**

Measuring connectivity?

Malawi / Internet users

3.3% of the population

2011



People also search for



Tanzania
12.0%



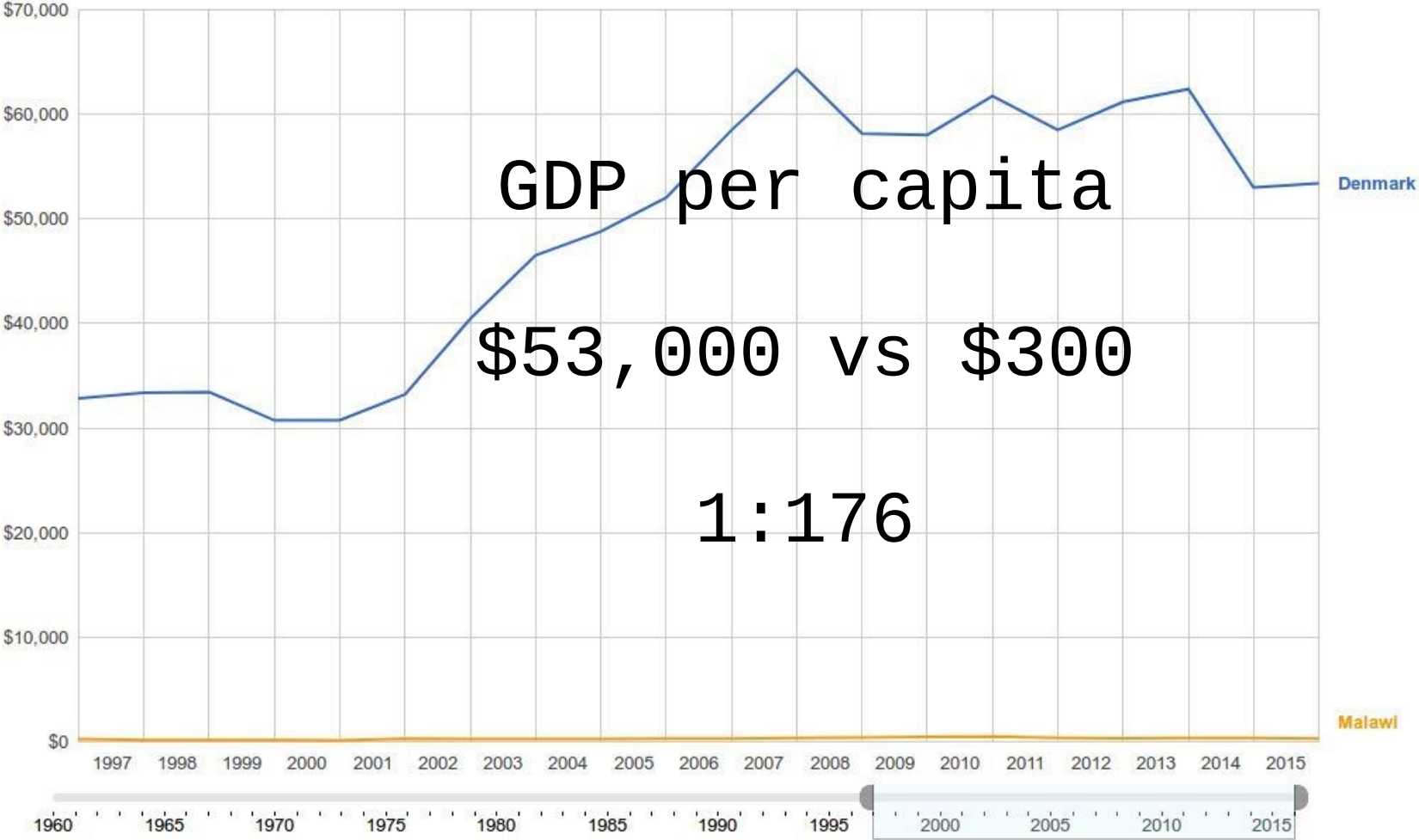
Zambia
11.5%



Mozambique
4.3%

Sources include: World Bank

[Feedback](#)



Measuring Internet connectivity

- SA, 2017: "There are about 29-million smartphones in use in South Africa but only 21-million Internet users [~40% of population], which tells us a quarter of the smartphone user base cannot afford data"
 - Of the 21-million total, 7-million use only mobile. The rest have [additional] access at work or use WiFi hotspots
- Can you stream?
- 1 school subscriber providing access to 1000 students for education?

On or off?

Need for offline

0 bandwidth ←-----→ Really fast

Available?
Affordable?
Stable?

Zero-rating

- Providing some services for free
- Net neutrality :(
- Rejected by India
- Zero-rating did not bring most mobile Internet users online for the first time. Nearly nine in 10 users surveyed report having used the Internet before accessing it through a zero-rated plan.



Let's be practical

Offline for Education



Sneakernet

- The idea that data is carried by foot (sneakers)
- Not fiction!
 - CDRs, USBs
- Has an enormous bandwidth
- Technological enablers
 - increasingly cheap storage media

Solutions that leverage the Sneakernet



Organizations that deploy offline



**Vodafone
Foundation**

...and other flavors



keepod 



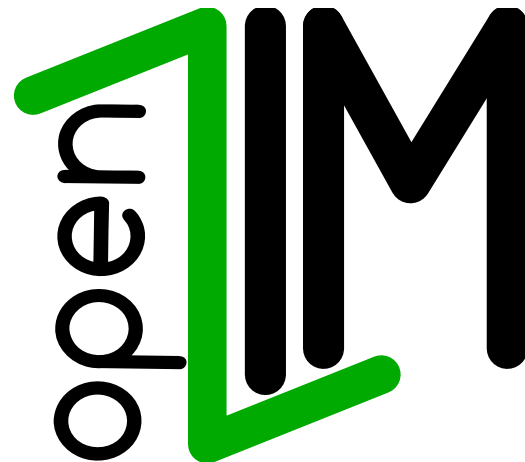
Reach of the Sneakernet?

- Fairly unknown... AFAIK.. but let's just say
C-O-N-S-I-D-E-R-A-B-L-E
- KA Lite estimate: 4.3 mio users
 - Khan Academy: >50 mio. online users registered

Demos: Kiwix & KA Lite

Kiwix

- Contents in OpenZIM format
- Kiwix is a .zim reader (client)
- Desktop application AND server



What's available?

- Wikipedia, WikiMed, WikiQuote, Wiktionary, Vikidia, WikiSource, WikiSpecies, WikiVoyage
- ... in all languages!
- TED Talks
- Some WikiLeaks stuff
- Gutenberg, CrashCourse, OER4Schools

KA Lite

- All of Khan Academy videos + exercises
- NOT static
 - Student accounts
 - Teacher accounts
- All languages
- Still alive and well supported

Kolibri

- Successor of KA Lite, which does more than Khan Academy
- Concept of 'channels'
 - Online content curation (creation of channels)
- Built by Learning Equality
 - Supported by a range of orgs: UNICEF, Google.org
- Public launch fall 2017

Manage Content - Kolibri

127.0.0.1:8080/management/#/content

KOLIBRI

Manage

admin (Device owner)

Learn

Coach

Manage

Profile

Sign out

CLASSES

USERS

FACILITY

DATA

CHANNELS

My channels

+ IMPORT

EXPORT

Channel	# Contents	Size	Last updated	
Khan Academy Testing	98	42 MB	11 minutes ago	Delete
Maharashtra state English Medium	2395	910 MB	11 minutes ago	Delete

Kolibri 0.5.0beta9

© 2017 Learning Equality

Elements

Console

Sources

Network

Performance

Filter

Regex

Hide data URLs

All

XHR

JS

CSS

Img

Media

Font

Doc

WS

Manifest

Other

100000 ms

200000 ms

300000 ms

400000 ms

500000 ms

600000 ms

700000 ms

800000 ms

```
osboxes@osboxes: ~/Desktop
ERROR:kolibri.content.utils.transfer:Error reading download stream: HTTPConnection(host='contentworkshop.learningequality.org', port=443): Read timed out.

WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: No row was found
()
30%|██████████| 2880326/9723482 [00:11<00:27, 247567.39it/s
WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: No row was found
()
INFO:kolibri.content.management.commands.importchannel:Downloading data for cha
95a52b386f2c485cb97dd60901674a98
100%|██████████| 77824/77824 [00:00<00:00, 218456.96it/s
WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: No row was found
()
WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: No row was found
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INFO:kolibri.content.management.commands.importchannel:Downloading data for cha
95a52b386f2c485cb97dd60901674a98
100%|██████████| 77824/77824 [00:00<00:00, 479232.20it/s
55%|██████████| 5389177/9723482 [00:35<01:26, 49901.87it/s
WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: No row was found
()
INFO:kolibri.content.management.commands.exportchannel:Exporting channel databa
/media/sf_1d6fca7d2596e3fb/KOLIBRI_DATA
INFO:kolibri.content.management.commands.exportcontent:Exporting content for ch
d_8b4d3e6d3d4842ba8ea658335b5dd252 to /media/sf_1d6fca7d2596e3fb/KOLIBRI_DATA
100%|██████████| 151552/151552 [00:00<00:00, 4069286.85it/s
INFO:kolibri.content.management.commands.exportcontent:Exporting content for ch
f_1d6fca7d2596e3fb/KOLIBRI_DATA
INFO:kolibri.content.management.commands.exportcontent:Exporting content for ch
d_8b4d3e6d3d4842ba8ea658335b5dd252 to /media/sf_1d6fca7d2596e3fb/KOLIBRI_DATA
WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: UPDATE statement
e 'jobs' expected to update 1 row(s); 0 were matched.
49%|██████████| 21816790/44290470 [00:11<00:11, 1922222.76it/s
WARNING:barbequeue.common.utils.WORKERMESSEGEHANDLER[angel-football-delta-delay
t an exception running <function <lambda> at 0x7fb2691f6230>: No row was found
()
```

...and more

- Ubuntu/Debian repositories offline through normal mirror services
- Making your own offline Intranet
- NFS, Samba shares w/ videos, ebooks
- Bring ISO images!
- Bring documentation!

How we use it in FAIR...



Bringing it all together

- Server + LAN
- WIFI vs. ethernet
- Laptops, desktops, thin clients
- (Really nice) to have: Projector, printer
- “Internet ready”



Offline against censorship

Strategies (roughly)

- Censorship
 - VPN
 - Tor
 - Proxies
- Shutdowns
 - Offline

Censorship and shutdowns

- Countries building censorship into the infrastructure
 - Blocking Internet access (social media) during elections
 - Easier to turn the big switch!
- Recently
 - Turkey blocks Wikipedia (2017) (@TurkeyBlocks on Twitter)
 - Cameroon English speaking province (93 days #KeepItOn 2017)
 - Unrests in Ethiopia (2016-2017)
 - Iraq national exams 2015, 2016, 2017
- Technological advances
 - Russia Bans 'Uncensored' VPNs, Proxies and Tor

Turkey, April 2017

Pinned Tweet



Turkey Blocks @TurkeyBlocks · Apr 29

Confirmed: All editions of the #Wikipedia online encyclopedia blocked in #Turkey as of 8:00AM local time
turkeyblocks.org/2017/04/29/wik...

```
Sat Apr 29 2017 08:02:55 GMT+0300 (+03)
https://en.wikipedia.org 5005 DOWN
https://tr.wikipedia.org 5009 DOWN
https://az.wikipedia.org 5009 DOWN
https://fr.wikipedia.org 5007 DOWN
https://www.wikipedia.org 5007 DOWN
```



Turkey Blocks @TurkeyBlocks · Apr 29

Replying to @TurkeyBlocks

Update: #Wikipedia blocked in #Turkey under administrative measure No. 490.05.01.2017-182198 / 5651 (no court order)
turkeyblocks.org/2017/04/29/wik...

5651 sayılı Kanun uyarınca yapılan teknik inceleme ve hukuki değerlendirme sonucunda bu İnternet sitesi (**wikipedia.org**) hakkındaki **Bilgi Teknolojileri ve İletişim Kurumu** 'nın **29/04/2017** tarih ve **490.05.01.2017.-182198** sayılı kararına istinaden **Bilgi Teknolojileri ve İletişim Kurumu** tarafından **İDARİ TEDBİR** uygulanmaktadır.

(After technical analysis and legal consideration based on **the Law Nr. 5651**, ADMINISTRATION MEASURE has been taken for this website (**wikipedia.org**) according to Decision Nr. **490.05.01.2017.-182198** dated **29/04/2017** implemented by Information and Communication Technologies Authority.)

15 505 151

Verifying/finding outages

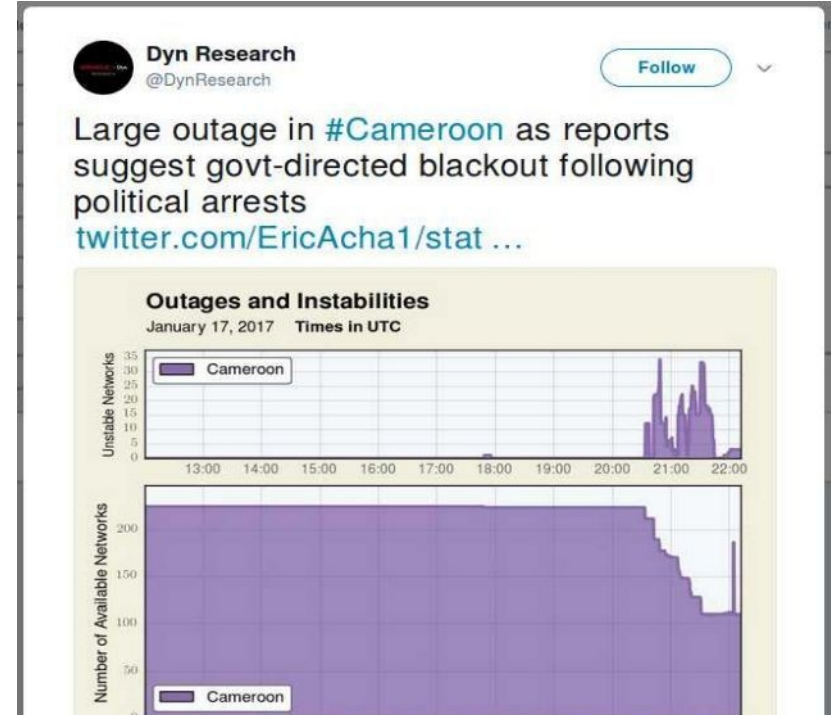
ht Hindustan Times  [@htTweets](#) [Follow](#)

Mobile internet and data services suspended in Punjab, Haryana and Chandigarh for 72 hours

[#RamRahimVerdict](#)



11:20 AM - 24 Aug 2017



Administrative procedures

dongle services.

3. And, whereas, to thwart the designs and activities of anti-national and anti-social groups/elements and maintain peace and communal harmony in the border State of Haryana, and to prevent any loss of life or damage to public/private property, it has become necessary to take all necessary steps and measures to maintain Law and Order in the State of Haryana in public interest, by stopping the spread of disinformation and false rumours, through various social media platforms, such as Whatsapp, Facebook, Twitter, etc. on mobile phones and SMS, for facilitating and/or mobilization of mobs of agitators and demonstrators, who can cause serious loss of life and/or damage to public/private property by indulging in arson/vandalism and other types of violent activities.
4. Now, therefore, in exercise of powers conferred upon me by virtue of Rule 2 of Temporary Suspension of Telecom Services (Public Emergency or Public Safety) Rules, 2017, I Home Secretary, Haryana do hereby order suspension of the (i) Mobile internet services (2G/3G/4G/CDMA/GPRS), (ii) all SMS services and (iii) all dongle services etc. provided on mobile networks **except voice calls** in the territorial jurisdiction of State of Haryana. Haryana Telecom Services providers and Head of BSNL (Haryana jurisdiction) are hereby directed to ensure compliance of this order.
5. This order is issued to prevent any disturbance of peace and public order in the jurisdiction of State of Haryana and shall be in force for the **next three days**, from the time this suspension order becomes operational.
6. This order is being passed ex-parte in view of the emergent situation. It shall be published for the information of public through press and means of communication.
7. Any person found guilty for violation of aforesaid order, will be liable for legal action.

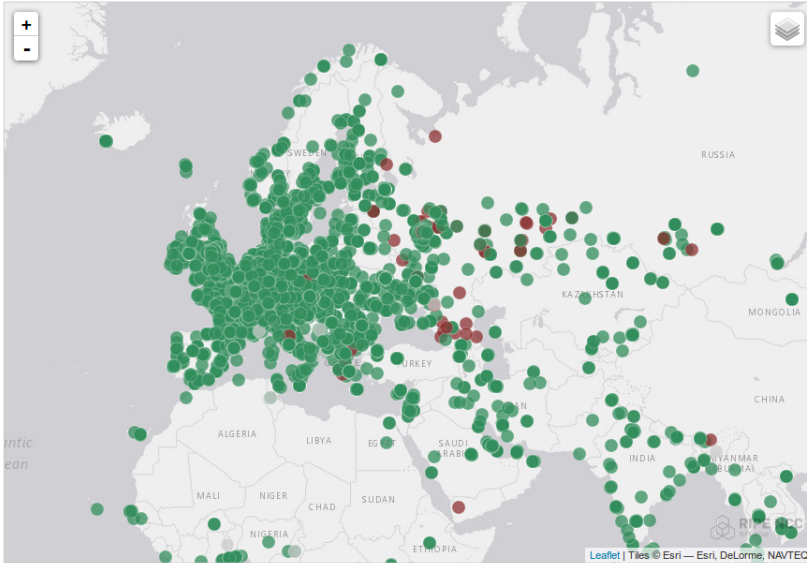


(Ram Niwas)

Addl. Chief Secretary to Govt. of Haryana,
Home Department

RIPE Atlas of available fixed points

- Typically does detect mobile Internet shutdowns



accessnow.org/keepiton



It's hard to censor offline data.

1. Be offline friendly

...

2. Be Offline first

Making data available offline

- Mediawiki is a good platform because of Kiwix scraping compatibility
- Building a self-contained open source HTTP server application (Django etc)
- At the very least: Don't put obstacles for others...

Don't do

- Weird licenses
- DRM
- Challenge ``wget --recursive``
 - Single-page websites/apps
 - If you have no offline strategy or services, at least don't block scrapers

Offline first



Application performance: Offline First

- Offline First
 - We live in a disconnected & battery powered world, but our technology and best practices are a leftover from the always connected & steadily powered past.
Offlinefirst.org
- Store user data locally = offline friendly
- Store ALL data locally = offline first

Too much online dependency?

- User pays for data
- Slow responsiveness
 - Always up to date = always fetching data

Offline first

- Obvious places where you have “first-world problem” connectivity issues:
 - Subway
 - Airlines
 - High-speed trains
 - In the woods
 - Big events

Offline first

- Frequently not having any data connection in even the wealthiest and most developed cities of the world has led us to conclude that no, the mobile connectivity/bandwidth issue isn't just going to solve itself on a global level anywhere in the near future.
- »Our carefully constructed app experiences become sources of frustration« Alex Feyerke (hood.ie)

Benefits

- UX: Faster
- Productive despite connectivity issues
- Simplifies design/architecture
 - Caching problems
 - No offline+online UI design
 - No push/pull error messages

Cloud vs. localhost

- Fonts
- Embeds and iframes
- Your whole database?
- S3 file/image hosting



A 4-day retreat to explore Offline First development and design

Try it yourself!

- Read about the ideas and discussions of Offline First:
 - <http://offlinefirst.org/>
- Go to the camp:
 - <http://offlinefirst.org/camp/>
- Be offline!

(summary kind of slide)

Let's do **offline** to help

- * Bring education to millions
- * Fight censorship

...and make better apps!

Talk more about offline:

Identify synergies between different
reasons for offline

Thanks! Questions?

Booth #7

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fair