The Anatomy of an
INTERNET BLACKOUT:
Measuring the Economic Impact of
Internet Shutdowns in India

Indian Council for Research on
International Economic Relations
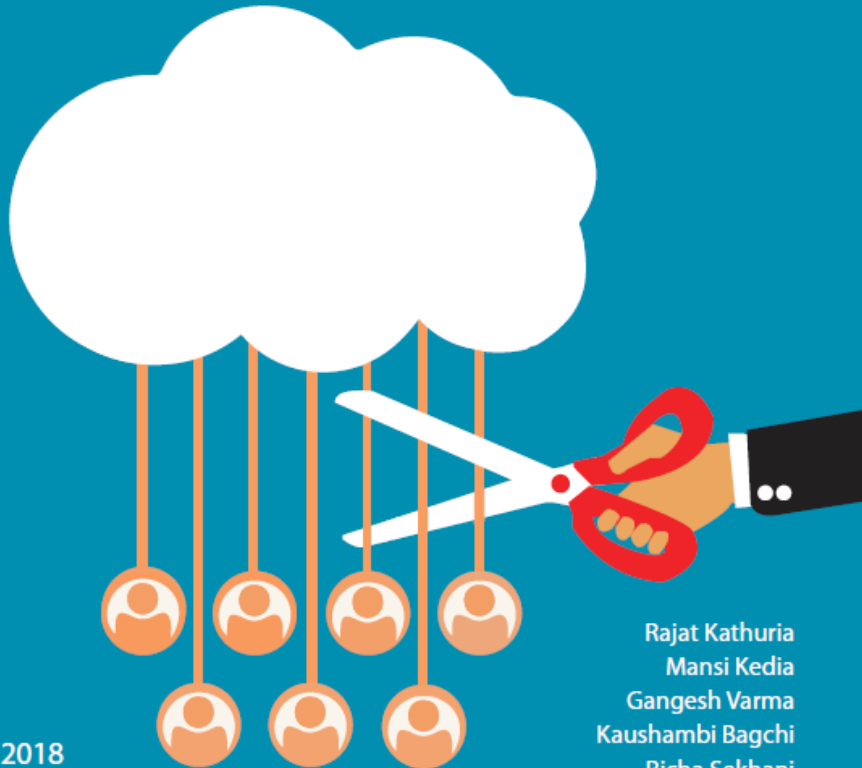
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Outline

- The Rise of Internet Shutdowns in India

- Economic Impact of Internet Shutdowns

- Quantitative Estimates

- Insights from Field Research

- Impact by Sector
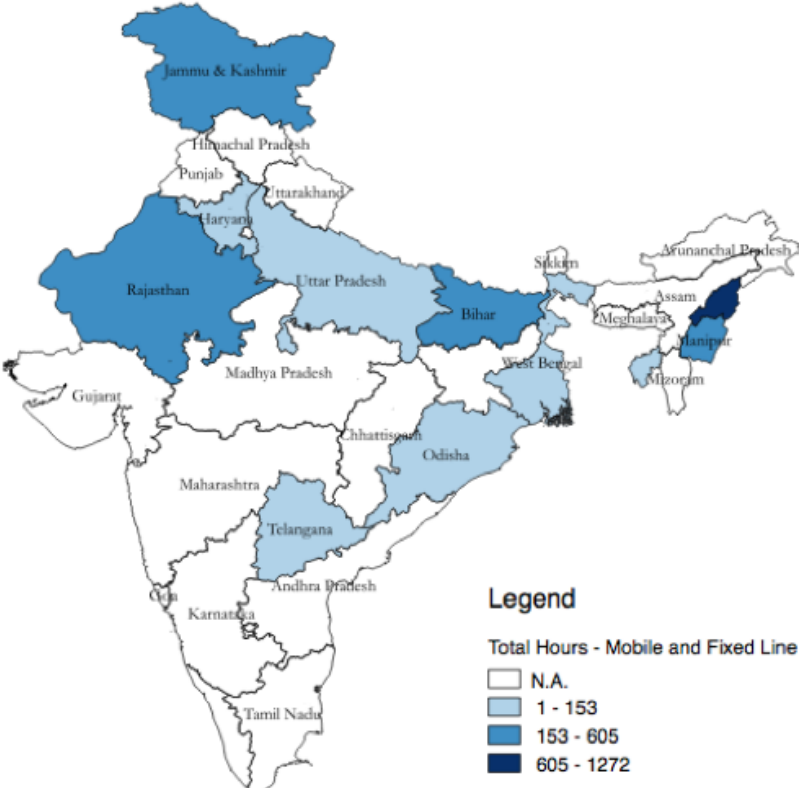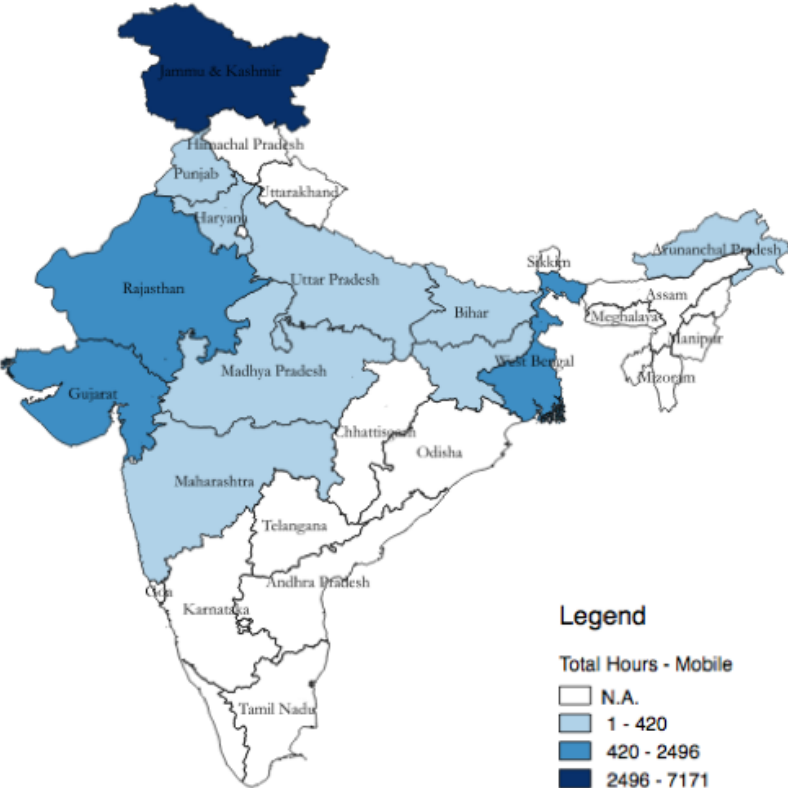
- Recommendations

The Rise of Internet Shutdowns in India

- Total number of shutdowns more than doubled in 2017 from 2016

- Total hours of shutdown increased by only 20%

- India has seen 40 internet shutdowns in 2018
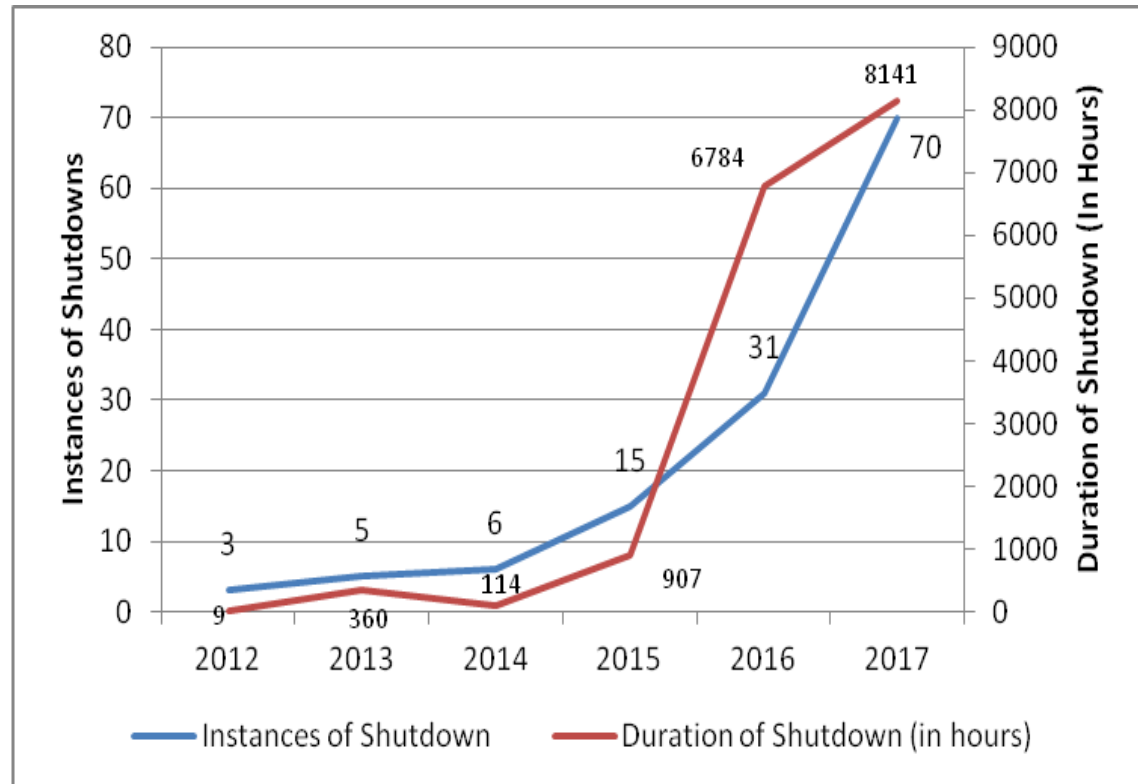
Internet shutdown trends in India

Some states more affected than others

Economic Impact of Internet Shutdowns
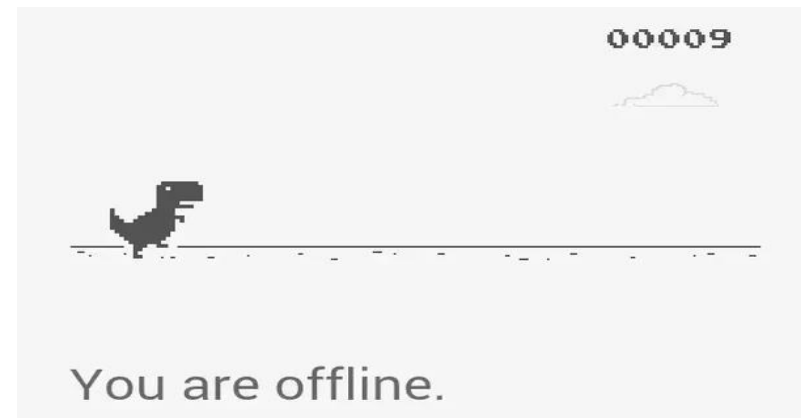
Quantitative Measurement

- Two-Step top down methodology
  - Estimate traffic affected by shutdown
  - Estimate economic cost of traffic affected using estimated elasticities

- Elasticities for mobile Internet and total Internet estimated using the instrumental variable method
- The measured elasticities are used to compute the economic impact of each shutdown reported in India between 2012 and 2017
- Each instance of shutdown is tabulated with details on regions impacted, duration and network disrupted (mobile / mobile and fixed line).
- Sample calculation
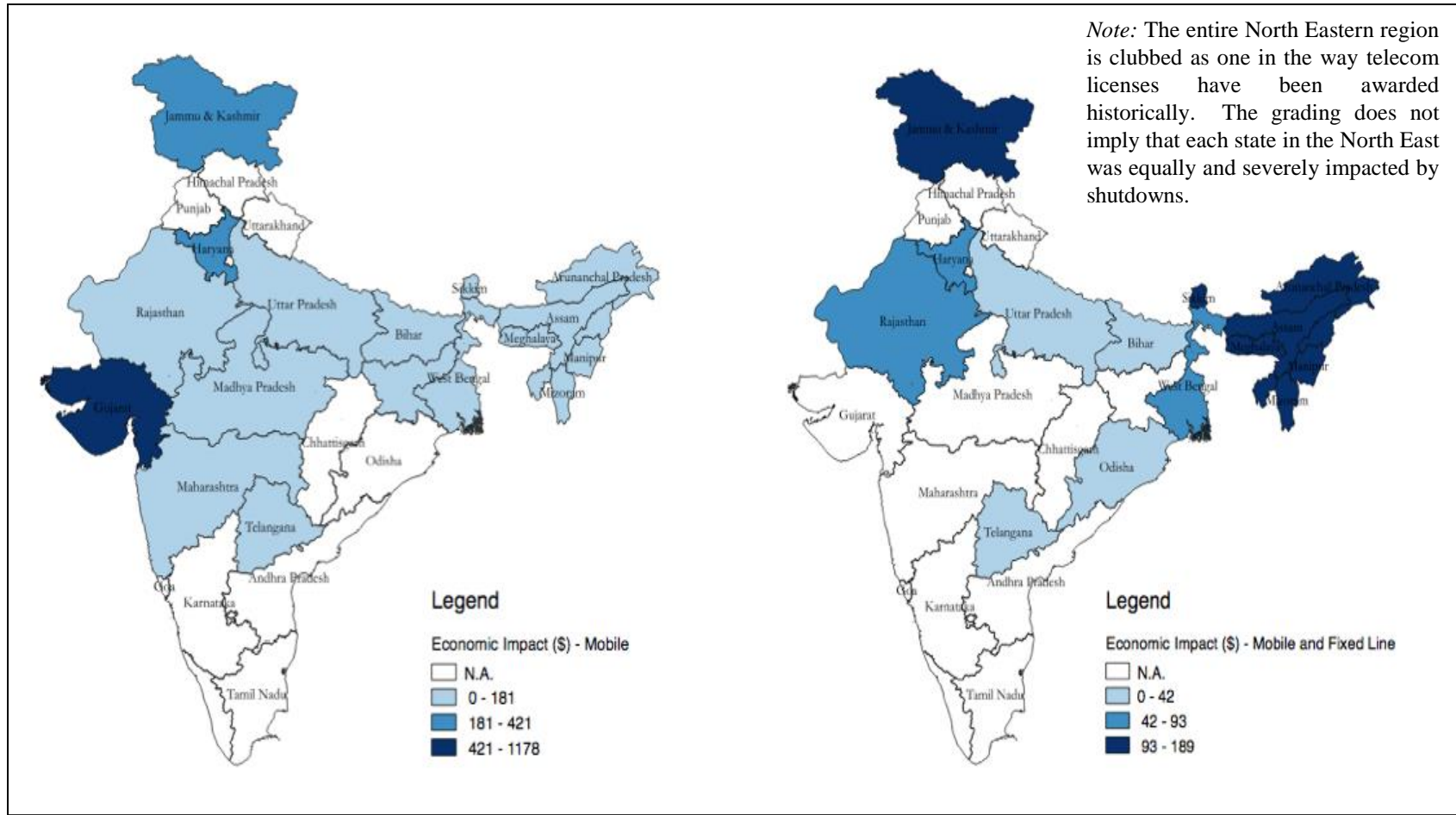
Qualitative Analysis

- The qualitative analysis is based on field interactions with concerned stakeholders (Government, Business, Society) in 7 out of 18 states affected by shutdowns during the period 2012 to 2017

- Analysis conducted around three distinct themes
  - Causes and characteristics of Internet shutdowns
  - Impact of Internet shutdowns
  - Alternatives to Internet shutdowns

Quantitative Estimates

- **16315 hours of Internet shutdown** in India cost the economy approximately **$3.04 billion** during the period 2012 to 2017

- **12615 hours of mobile Internet** shutdowns in India cost the economy **approximately $2.37 billion** during the period 2012 to 2017

- **3700 hours of mobile and fixed line Internet shutdowns** in India cost the economy approximately **$678.4 million** during the period 2012 to 2017

- **Average estimate of hourly loss for India over the various shutdowns during 2012-2017 is US $ 186,332**. In comparison, a country wide shutdown in Egypt is estimated to have cost the economy US$ 750,000 per hour in 2011 (OECD, 2011). An hourly estimate for social network shutdown in Brazil was US $ 966,985 (estimated using Brookings, 2016)

00009

You are offline.

Regional Impacts

Note: The entire North Eastern region is clubbed as one in the way telecom licenses have been awarded historically. The grading does not imply that each state in the North East was equally and severely impacted by shutdowns.

Legend

Economic Impact ($) - Mobile
- N.A.
- 0 - 181
- 181 - 421
- 421 - 1178

Legend

Economic Impact ($) - Mobile and Fixed Line
- N.A.
- 0 - 42
- 42 - 93
- 93 - 189

Placing a caveat: The estimated magnitudes could be high since they are computed from macro-economic data reflecting the model assumption that assigns a uniform impact across the affected region. Moreover, there is no way to capture in the macro data, adjustments made to overcome the temporary shutdown. Supplementing with a qualitative analysis

Insights from Field Research

Rumour-mongering or provocative messaging on social media and instant messaging platforms are the primary reasons driving Internet shutdowns

Significant heterogeneity in impact across user groups

Affects smaller businesses relatively more than larger businesses that are able to find alternatives

State	Stakeholders					
	Government		Business	Society		
	Administrator	User		Press/Media	Social Institutions	Individuals
Bihar	√	×	√	√	√	×
Gujarat	√	×	√	×	√	√
Haryana	√	×	×	×	×	×
Jharkhand	√	×	√	×	√	×
Kashmir	√	×	√	√	√	√
Rajasthan	√	×	√	√	×	×
West Bengal	√	√	√	√	√	×
Uttar Pradesh	×	×	×	×	×	×
Madhya Pradesh	×	×	×	×	×	×
Telangana	×	×	×	×	×	×
Punjab	×	×	×	×	×	×
Odisha	×	×	×	×	×	×
Maharashtra	×	×	×	×	×	×
North East including Nagaland, Manipur, Arunachal Pradesh, Meghalaya and Tripura	×	×	×	×	×	×

Impact Across Sectors of the Economy

Businesses such as **e-commerce** suffer most during shutdowns along with online freelancers who operate out of small towns and are completely dependent on a functioning Internet.

Impact on **banking services** is limited as their operations run on private leased lines and remain uninterrupted by shutdown of the public Internet. At best, small volumes of online banking transactions get disrupted.

Sectors that are heavily Internet dependent, such as **tourism, IT services and the news media industry** are also adversely affected
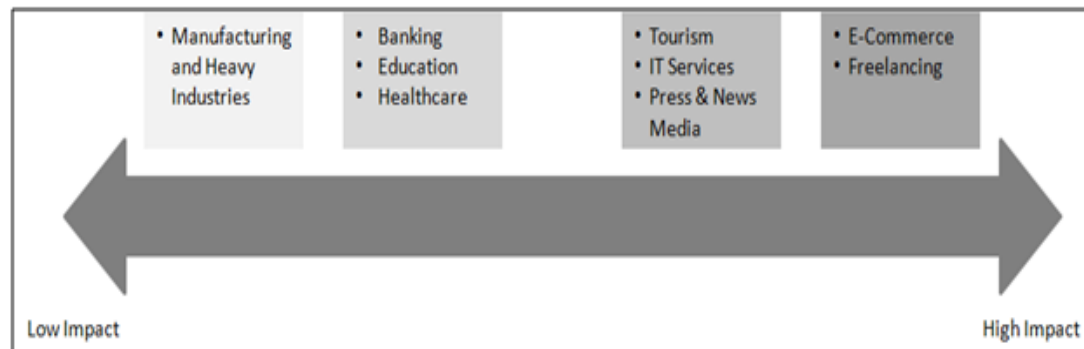
Level of Impact Across Sectors of the Economy

For Future Course of Action

- Building a Civilian Line of Reporting

- Curbing Disproportionate Internet Shutdowns

- Providing Official Notification or Communication of Internet Shutdowns

- Documenting Internet Shutdowns

- Building Corporate Accountability

- Improving Connectivity and Providing Alternatives

- Using and Promoting Effective Counter-speech

- Promoting educative campaigns on curbing hate speech, and inflammatory messages

- Promoting Independent Fact Checking

- Sharing best practices and capacity building across states

THANK YOU

Report available at www.icrier.org

Questions and comments are welcome

Econometric Formulation

Log GDP_PC$_{it}$ = α + βLog (K/L)$_{it}$ + νLog (MobileInternetTraffic)$_{it}$ + D$_i$ + ε   (i)

Log GDP_PC$_{it}$ = α + βLog (K/L)$_{it}$ + νLog (TotalInternetTraffic)$_{it}$ + D$_i$ + ε   (ii)

Where i goes across 19 telecom circles of India and t runs from 2012-13 to 2016-17, Di are 19 circle dummies, α and ε are the Constant and Error terms respectively

In equation (i),

Log GDP_PC$_{it}$ is the logarithmic value of nominal state domestic product per capita in rupees lakhs (using the 2011-12 base) for the *ith* circle in year t. Data for this variable has been extracted from the State Series data of the National Accounts (CSO)[2].

Log (K/L)i$_t$ is the logarithmic value of capital intensity as measured by Net Investments (Net of investments in telecommunication) in rupees lakhs for the *ith* circle in year t divided by Total Persons Engaged in the *ith* state in year t. Data on Net Investments has been estimated by subtracting investments in telecom from total gross capital formation in the country and distributed across states using the proportion of factories as distributed across states. Data on Net Investments is extracted from the National Accounts Statistics (CSO) and on number of factories from the Annual Survey of Industries. Labour is measured using data on state-wise higher education enrollment[3].

Log (MobileInternetTraffic)$_{it}$ is the logarithmic value of mobile Internet traffic in petabytes per month for the *ith* circle in year t. In the absence of circle level data, mobile Internet traffic for India has been distributed using the proportion of adjusted gross revenue accruing to each circle. CISCO VNI made data on total Internet traffic in India available and data on adjusted gross revenue was extracted from TRAI's Financial Reports.

In equation (ii),
All variables remain the same, except Log (TotalInternetTraffic)$_{it}$ which is the logarithmic value of total Internet traffic in petabytes per month for the *ith* circle in year t. Similar to the method in equation(i) national level data has been distributed by state

Sample Calculation

The first step is to estimate the traffic impacted by a given shutdown.

For instance, there were 216 hours of mobile Internet shutdown in Ahmedabad in 2015. To derive traffic impacted we use the product of the following (i) Ahmedabad's population as a proportion of Gujarat using Census data (ii) duration of the shutdown in proportion to the year (365*24) (iii) total mobile Internet traffic for Gujarat in 2015. Since shutdowns are mostly ordered at the district level, and comparable district wise data is available from census 2011, we use that data to calculate the population proportions affected by the shutdown. The reported duration of shutdowns are available in hours and converted to proportions in the calculation represented in equation I:

$Traffic\ impacted_t = Traffic\ for\ the\ circle_t * Population\ Proportion * shutdown\ proportion\ (annualized)... (I)$

The traffic impacted is converted to a percentage amount and subsequently multiplied by circle GDP of the previous period and by the estimated mobile/total Internet elasticity to arrive at the economic cost of the shutdown. Continuing with the example for Ahmedabad, the economic cost of the shutdown is measured by percentage loss in Internet traffic multiplied by State GDP of Gujarat in the previous period and mobile Internet elasticity. The calculation is represented below in (II)

$Economic\ Impact\ of\ a\ shutdown_t = GDP_{t-1} * \%\ Loss\ in\ Traffic * Network\ elasticity\ (mobile/\ total\ Internet)... (II)$

The three key assumptions in this method are:

- At the margin, the impact elasticities of total Internet and mobile Internet are uniform whether measuring economic benefits or economic losses
- Internet usage is distributed evenly by population i.e. higher population implies higher usage
- Internet traffic is distributed evenly by population across the State