

Increasing broadband adoption in PK – lessons from emerging Asia

Helani Galpaya
Lahore, Mar 2014



This work was carried out with the aid of a grant from the International Development Research Centre, Ottawa, Canada.



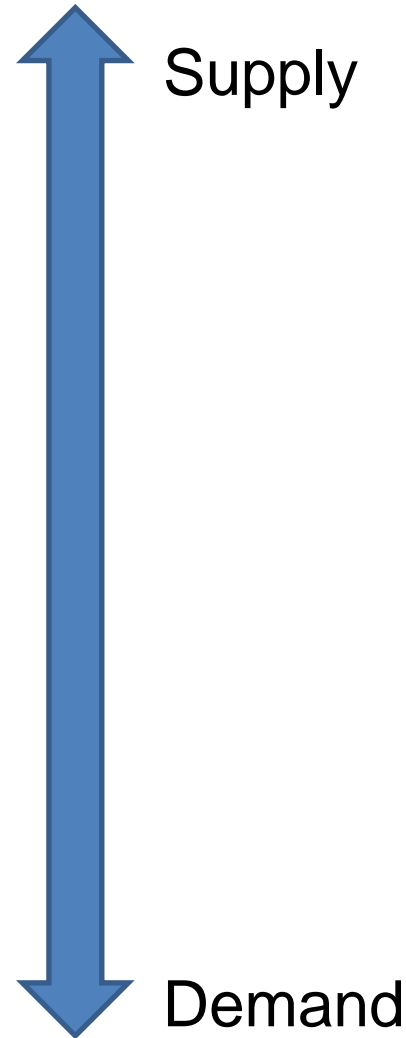
IDRC | CRDI

International Development Research Centre
Centre de recherches pour le développement international

Canada

Increasing use: many pieces need to fall together

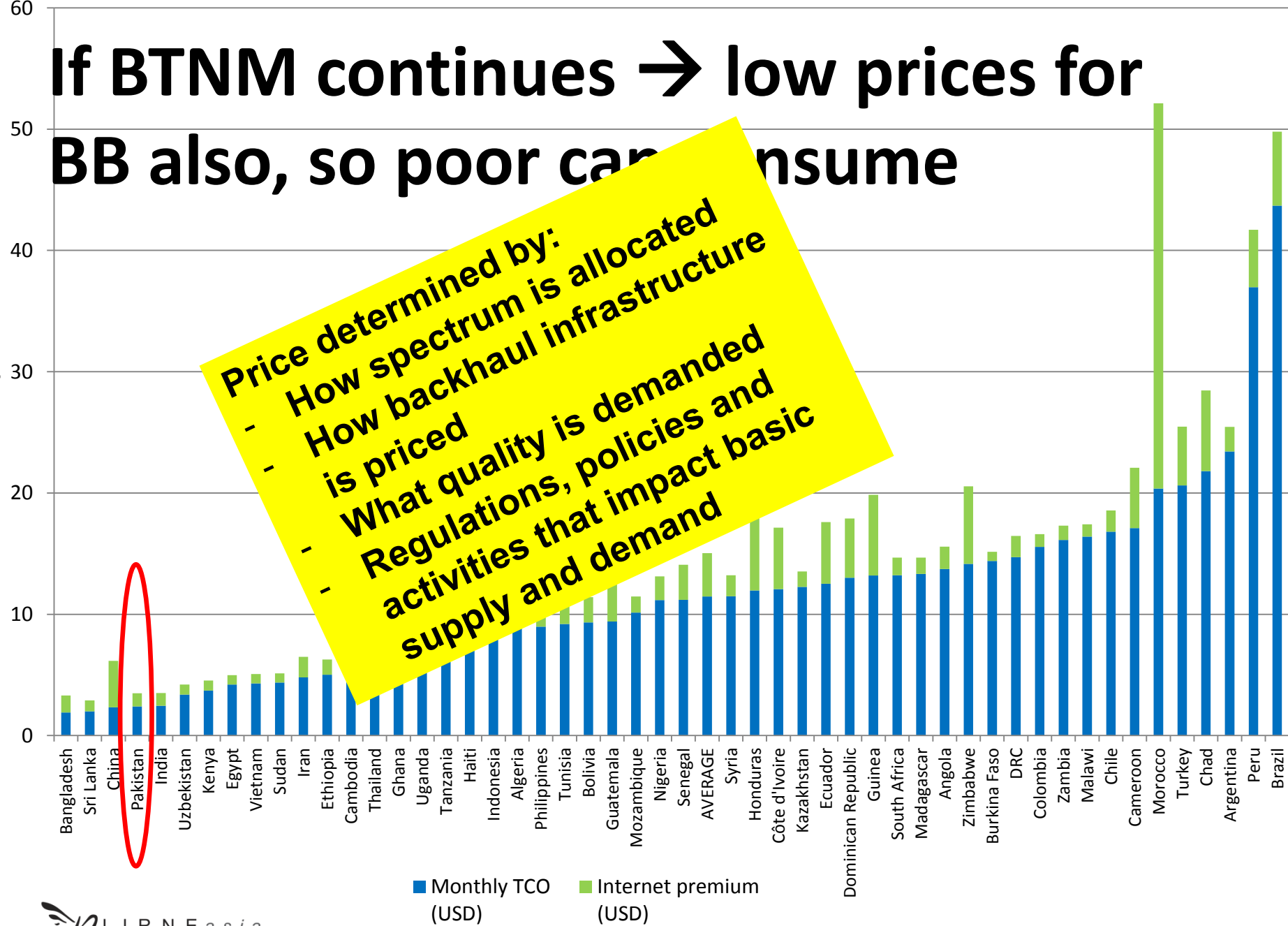
- Infrastructure
 - availability, price, quality
- Handsets
 - affordability, features
- Applications/Content
 - Data biz models, echo sys.
- Users
 - Capability, 'needs', interests



PRICE

If BTNM continues → low prices for BB also, so poor can consume

USD per month



INFRASTRUCTURE

National level planning for BB is taking place as BB becomes priority

Malaysia	India	Indonesia	Australia
<ul style="list-style-type: none"> ➤ HSBB – High Speed BB project ➤ FTTH in high industrial areas: Inner Klang Valley, Industrial areas and Iskandar Malaysia ➤ BBGP – BB to General Population in non-commercial areas ➤ Initiate 2008. Launched 2010. ➤ All targets met ➤ 1.3 million ports by 2010 planned; 1.43 actually (43%) ➤ 50 household penetration by 2010 exceeded (55% in 2010; today 67%) 	<ul style="list-style-type: none"> ➤ National Broadband Network (NBN) ➤ Connecting 250000 gram panchyats, (local administrative region for group of villages) ➤ To deliver ICT based goods and services to the rural households ➤ ‘by December 2012’ 	<ul style="list-style-type: none"> ➤ Govt funds mainly covering the East ➤ Western islands already have fibre connectivity via private operators OR promised connectivity by incumbent (TELEKOM) ➤ 12% → 75% mobile BB by 2017 target ➤ 30% → 50% of buildings at 100Mbps by 2017 ➤ 15% → 40% household fixed BB by 2017 	<ul style="list-style-type: none"> ➤ 93% of premises using FTTH/FTTP technology providing broadband speeds of up to 1 Gbps, ➤ Remaining 7% in regional and rural Australia (fixed wireless and next generation satellite: peak speeds of up to 25 Mbps). ➤ Live in 2010. But ‘on hold’/might change under new government ➤ Forecasted to miss 2021 deadline and exceed costs (budget nearly to double)

Mix of public & private funding; state once again a big player. Early days

Malaysia	India	Indonesia	Australia
<ul style="list-style-type: none"> ➤ Total USD 3.5 billion. ➤ PPP with 30% govt. funds; 70% incumbent Telekom Malaysia (TM 27% govt owned) ➤ Seen as fastest way to implement (TM had most existing fibre) ➤ Quarterly disbursement of funds based on implementation milestones. ➤ V fast implementation. ➤ 43% take up. 	<ul style="list-style-type: none"> ➤ USD 4 billion project funded by USOF (5% of operator revenue) ➤ Special purpose vehicle called BBNL set up. BBNL fully govt owned. ➤ BBNL whole-sale only player ➤ BBNL consist of Bharat Sanchar Nigam Ltd (BSNL, incumbent Fixed operator), RAILTEL (telecom arm of the Indian Railways), GAILTEL , Gas Authority of India and Power Grid Corporation 	<ul style="list-style-type: none"> ➤ USD 1 billion committed by government. ➤ Largest proportion from USO fund calculated as 1.25% of operators' revenue ➤ PPP but has not been implemented yet. 	<ul style="list-style-type: none"> ➤ Total cost anticipated at A\$43 billion (USD 40 B) but this figure kept changing. ➤ Funding through taxpayer funds – to be sourced from government equity until NBN Co has sufficient cash flows to function without government support. ➤ New company (NBN Co.) setup. ➤ NBN Co – only wholesale, can't compete with other operators.

All claim open access. But implementation details determines competition

Malaysia	India	Indonesia	Australia
<ul style="list-style-type: none"> ➤ Called 'open access' ➤ But conditions commercially negotiated. Not public ➤ TM allowed to sell wholesale (transmission/backhaul) AND retail (access) ➤ Services cannot be unbundled. ➤ TM & 1 other operator (Maxis) offer identically priced retail product bundle. ➤ 4 major operators have signed up for HSBB access services. So competition may rectify. ➤ 17 transmission buyers: positive 	<ul style="list-style-type: none"> ➤ Yes, on paper ➤ But terms and conditions have not been agreed yet. ➤ Impacts decision of operators/bidders to enter/bid for/price NOFN ➤ Does BSNL's role (in wholesale BBNL + already in retail) pose competition issues? 	<ul style="list-style-type: none"> ➤ Yes, but terms and conditions have not been agreed yet. ➤ Impacts decision of operators/bidders to enter/bid for/price NOFN 	<ul style="list-style-type: none"> ➤ Standard access obligations ➤ Non discrimination obligations ➤ Transparency obligations ➤ all been documented.



Getting this right is key. But not easy

- Ideal: do everything with (new) private operator participation
- Reality: many areas not commercially viable (today); incumbent's advantage and capability
- Goal: spend least public funds, have most private participation
- But design can make it attractive or not
 - NON-DISCRIMINATORY and OPEN access
 - TRANSPARENT (cost-reflective) pricing
 - CERTAINTY of what type of whole-sale vs retail separation

**QUALITY (ONCE YOU'VE GOT
PRODUCTS IN THE MARKET)**

BB QoSE impacts user experience. But needs light regulatory touch in early days

- Demands on network will increase after 3G/4G spectrum is used
- Quality to be monitored/tested
- Goal of testing
 - To diagnose bottlenecks and correct
 - To inform users (so they can make choices)
- But NOT to regulate and punish in early stages
 - at the expense of network (3G/4G) rollout

What to measure? Think beyond download speed

Service	Download (kpbs)	Upload (kpbs)	Latency (Round Trip Time, RTT) (ms)	Jitter (ms)	Packet Loss (%)
Browsing (Text)	++	-	++	-	-
Browsing (Media)	+++	-	++	+	+
Downloading	+++	-	-	-	-
Transactions	-	-	++	+	-
Streaming media	+++	-	-	++	++
VOIP	+	+	-	+	+++
Games	+	+	-	++	++

With increased use of cloud resources, this changes. E.g. upload as important as download

+++ Highly relevant; ++ Very relevant; + Relevant; - Irrelevant

- **RTT** has implications on client-server interactive systems
- **Jitter** adds to the 'noise' of the transmission
- **Packet Loss** affects streaming media

Hardware-based testing offers accuracy, but may be expensive



Join our European campaign...
Sign up with us today to accurately measure your broadband performance.

[Sign Up](#)

[Requirements](#)

[Installation Guides](#)

[FAQs](#)

[Contact Us](#)

[SamKnows.com](#)



Select language

Measure your broadband accurately

Together, the European Commission and SamKnows aim to provide Europe with reliable and accurate statistics of broadband performance across Europe.

Volunteers will receive a purpose-built broadband measurement unit which can be plugged into the existing modem/router. This is called the SamKnows Whitebox.

If you are interested in helping us by hosting a SamKnows Whitebox, and playing a part in changing the face of the European broadband industry, then please sign up below!

It's worth taking the time to read through the requirements before proceeding.

Please note that not everyone who registers here will necessarily receive a SamKnows Whitebox - we do however thank all of you for helping to make European broadband better.

SamKnows & you:
Working together
for better broadband



- Equipment directly connects to the line between the router and the PC → Accurate
- Expensive
- SamKnows is being used by the FCC (US), Ofcom (UK), IDA (Singapore), European Commission etc.

Software may be more cost effective. E.g. Speed Test, AT Tester, other

A T TESTER

Test Results Configuration Schedule FAQ About

Select Service Provider
Select Your Service Provider
Service Provider Request for your service provider to be added to the list

Select Your Package

Your Email Address (Optional)

This is required if you want to retrieve your test results at a later date

DOMAINS *At least one domain must be selected

ISP National International

To get the most accurate results, please close all other browsers and stop other processes that may slow down your connection

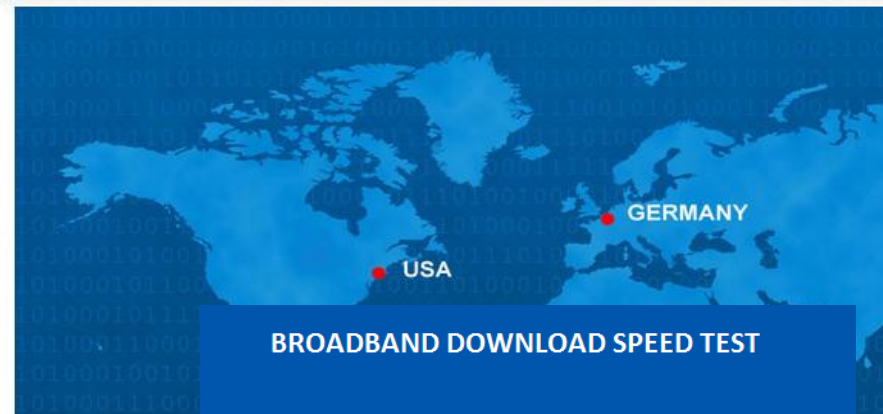
METRICS *At least one metric must be selected

Download Latency Packet Loss

Upload Jitter Network Availability

ශ්‍රී ලංකා විදුලි සංදේශ නියාමන කොමිෂන් සභාව
இலங்கை தொலைத்தொடர்புகள் ஒழுங்குபடுத்தும் ஆணைக்குழு
Telecommunications Regulatory Commission of Sri Lanka

HOME ABOUT US SERVICES PRESS ROOM INFORMATION BROADBAND CONTACT US



BROADBAND DOWNLOAD SPEED TEST

Select the file size to download

1 MB 10 MB 35 MB 100 MB

Please wait.....

TEST SPEED

- Levels of accuracy can vary
- Cost effective
- Speed Test: used by TRCSL (Sri Lanka)
- AT Tester: used by ICTA (Mauritius), BICMA (Bhutan), CAM (Maldives), PIRRC (Fiji), LIRNEasia (since 2008)

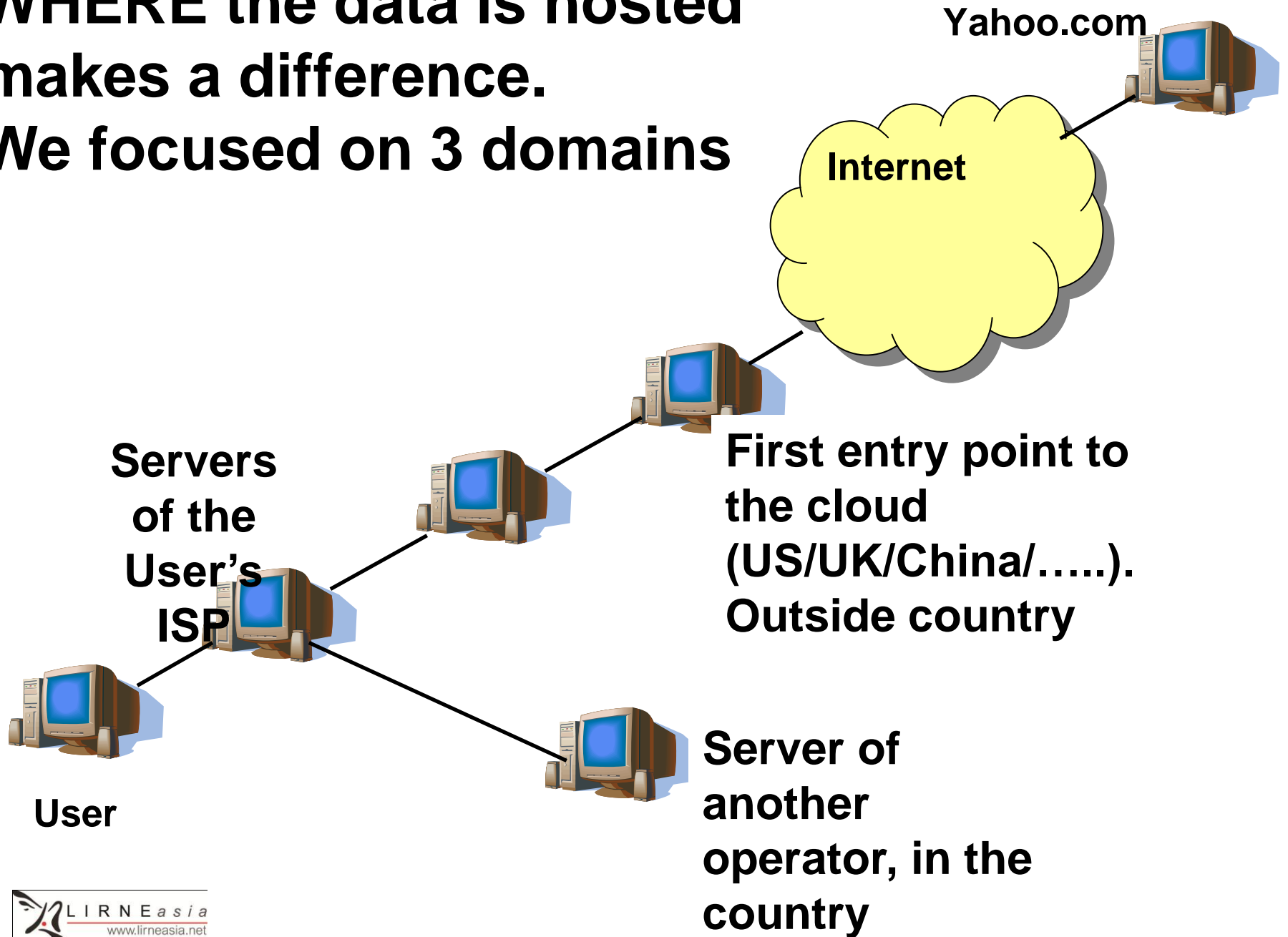


LIRNEasia's approach: Software based, new testing methodology

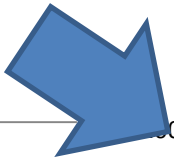
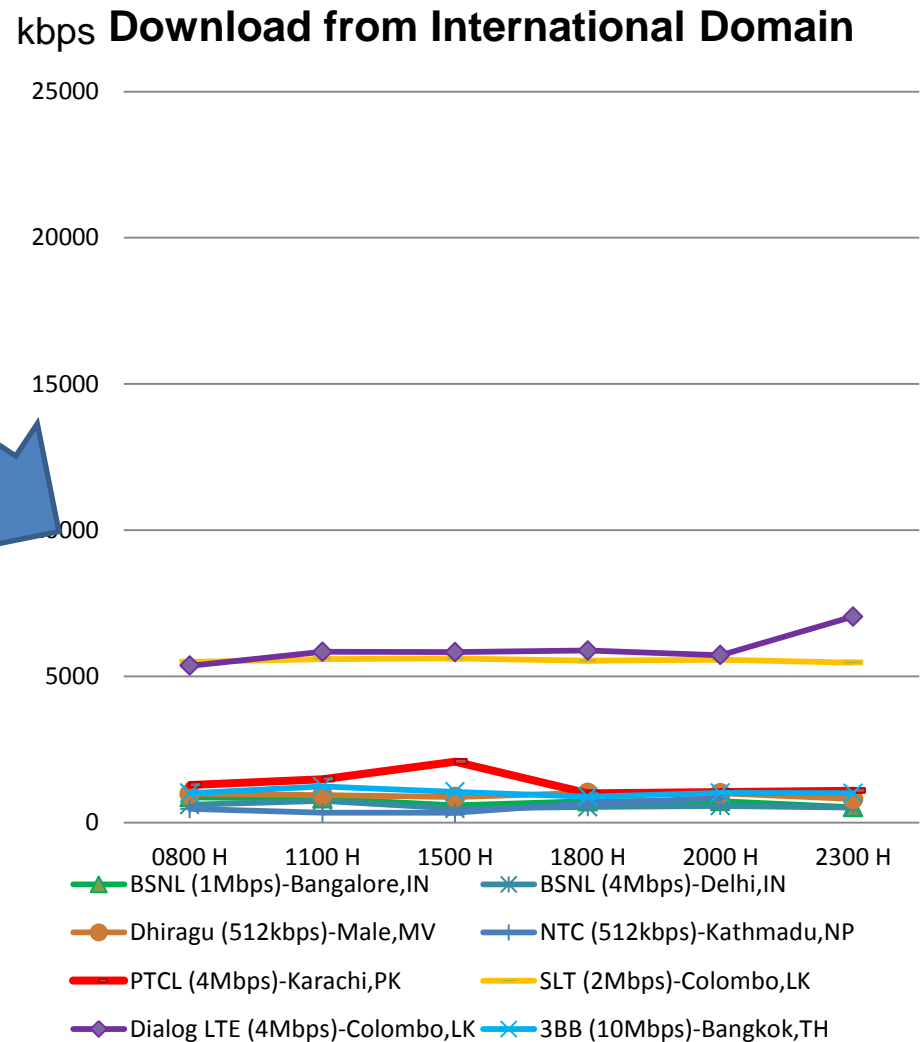
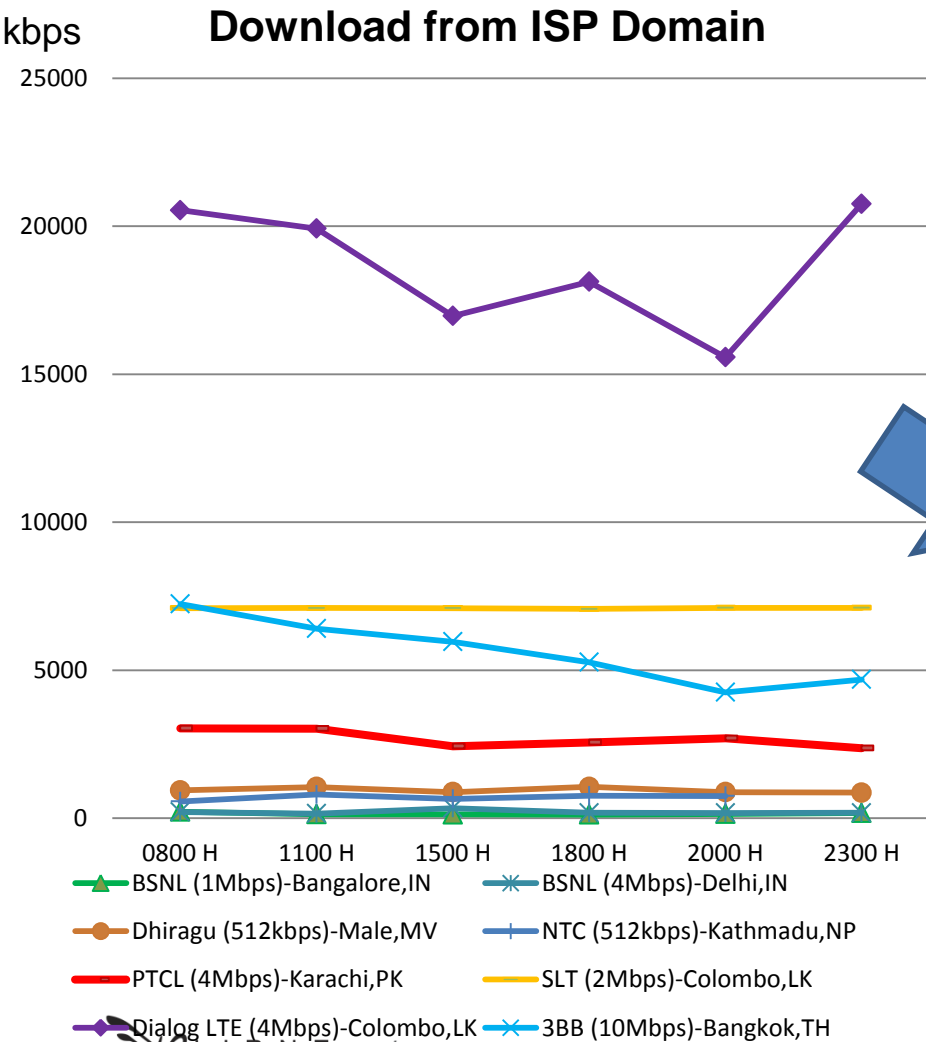
- Developed methodology and software in partnership with Indian Institute of Technology (IIT), Madras
- Multiple broadband packages or links
- Multiple times a day
 - 6 times a day; ranging from peak to off peak
- Multiple Locations (cities)
- Testing in multiple domains
 - ISP, National and International

WHERE the data is hosted makes a difference.

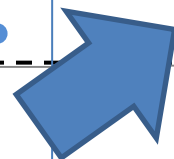
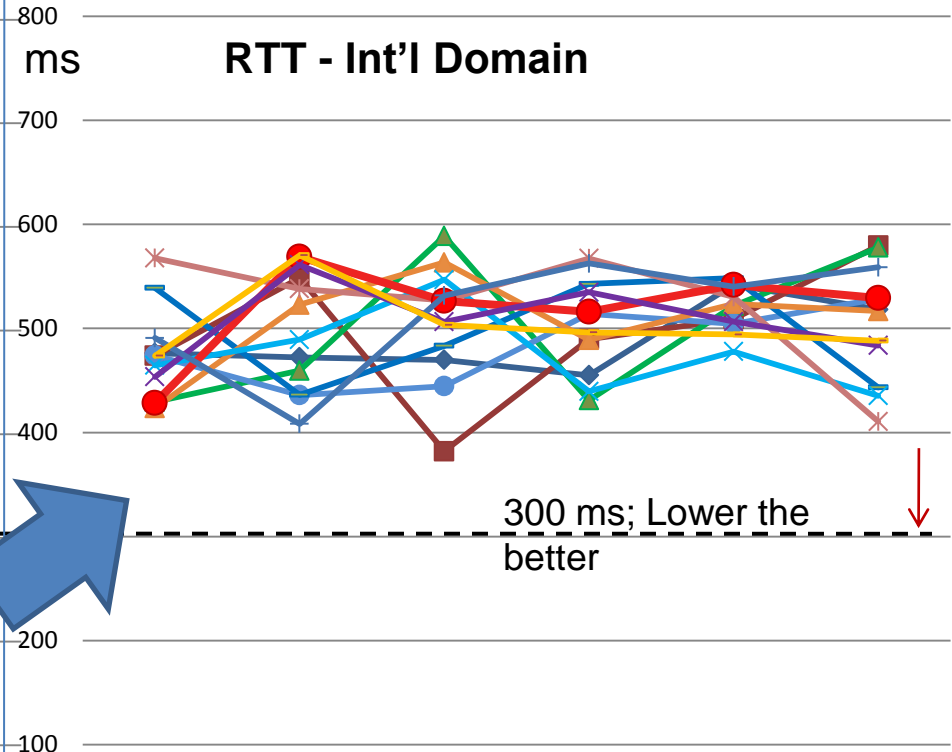
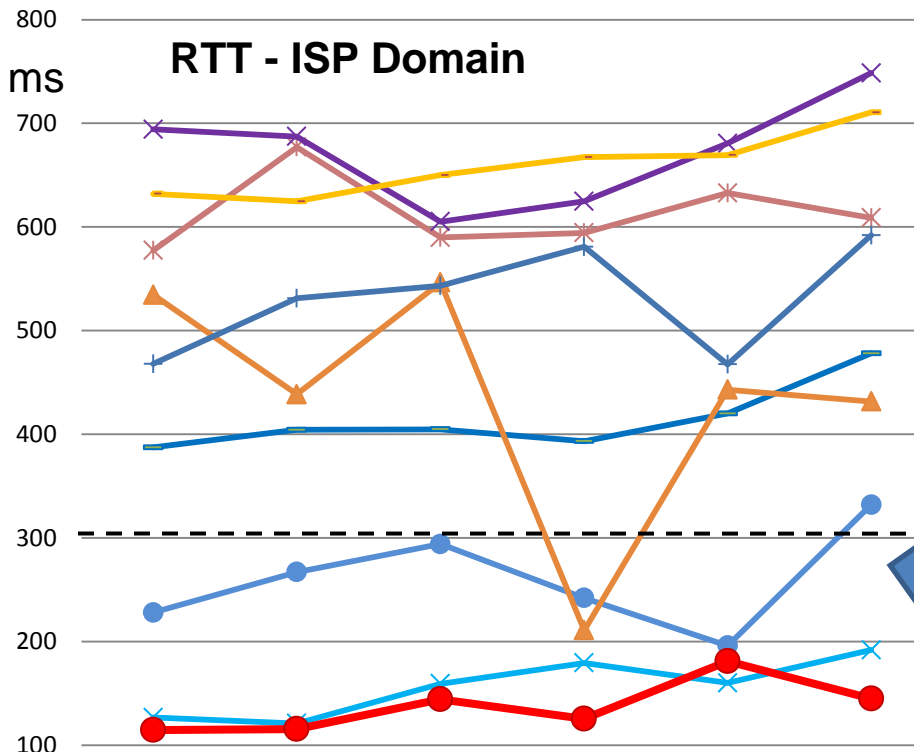
We focused on 3 domains



Mar 2014 fixed BB tests show int'l bottleneck for many countries



Similarly in mobile BB, though less consistently across countries



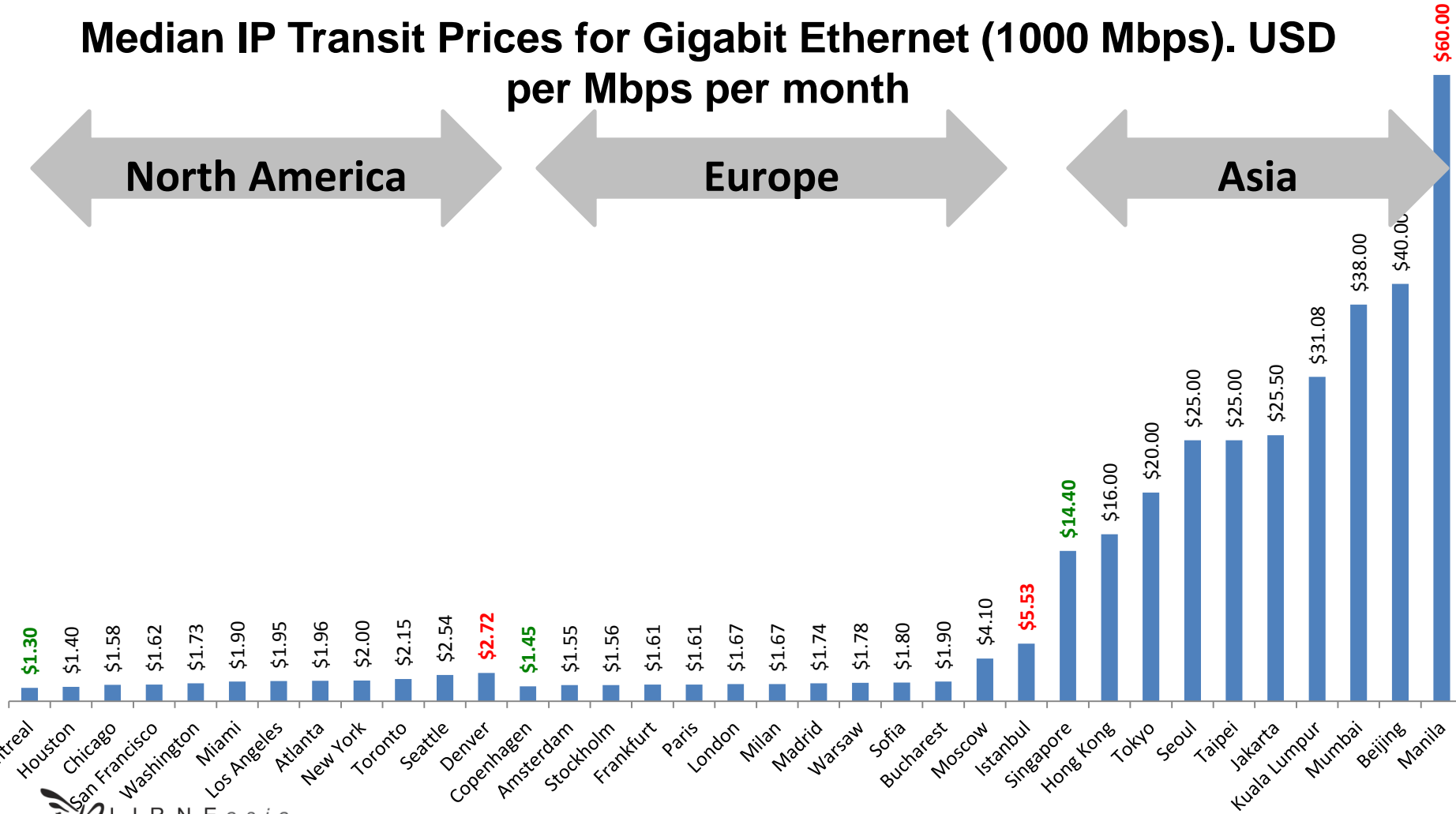
300 ms; Lower the better



- Grameenphone (512kbps)-Dhaka,BD
- Tata (6.2Mbps)-Chennai,LK
- Ncell (7.2Mbps)-Kathmandu,NP
- Dialog (2.16Mbps)-Colombo,SL
- Mobitel (3.6Mbps)-Colombo,LK
- Airtel (Speed)-Bangalore,IN
- Dhiraagu Data 200 (1Mbps)-Male,MV
- PTCL Evo (9.3Mbps)-Karachi,PK
- Etisalat (7.2Mbps)-Colombo,LK
- Tata (6.2Mbps)-Chennai,IN
- Ncell (7.2Mbps)-Kathmandu,NP
- Dialog (2.16Mbps)-Colombo,SL
- Etisalat (7.2Mbps)-Colombo,LK
- PTCL Evo (9.3Mbps)-Karachi,PK
- Etisalat (7.2Mbps)-Colombo,LK
- Mobitel (3.6Mbps)-Colombo,LK

Not surprising: Asian prices high compared to N. America & Europe.

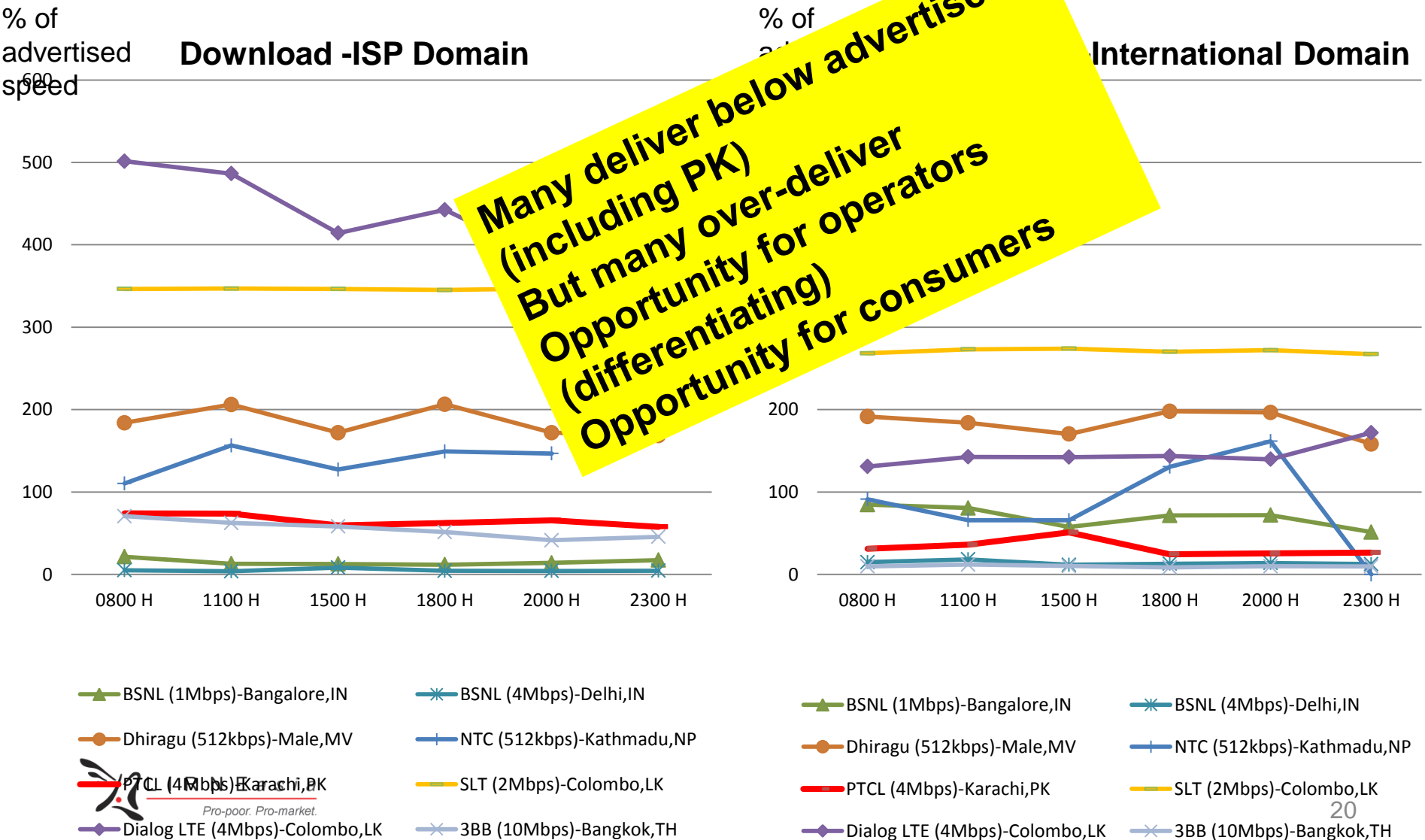
Median IP Transit Prices for Gigabit Ethernet (1000 Mbps). USD per Mbps per month



Source:  LIRNEasia
Source: TeleGeography.

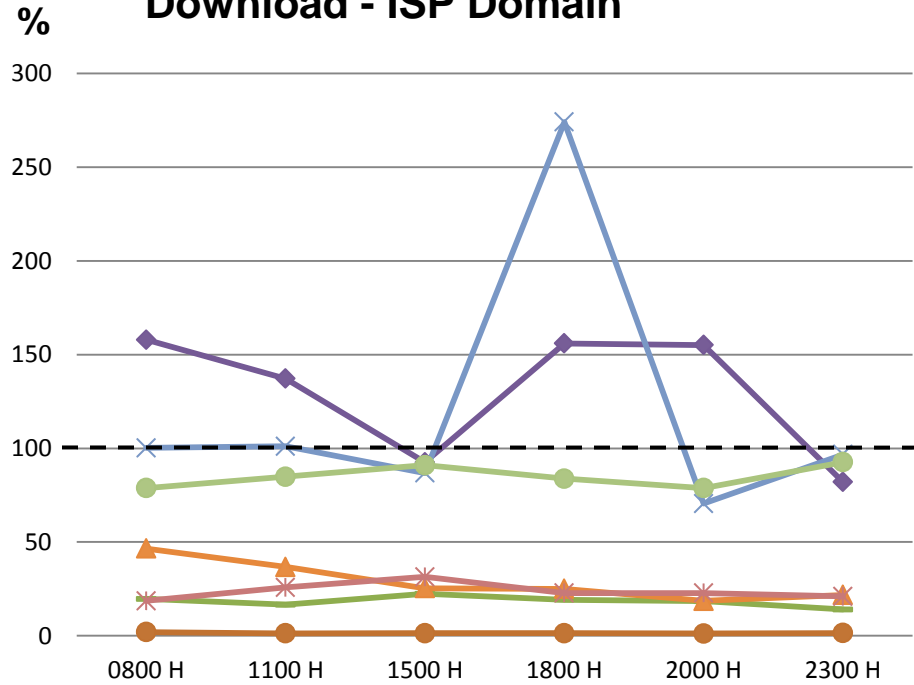
Note: Cost for a full-port commit. Does not include local access and installation.

In fixed BB, actual performance differs from advertised. In surprising ways

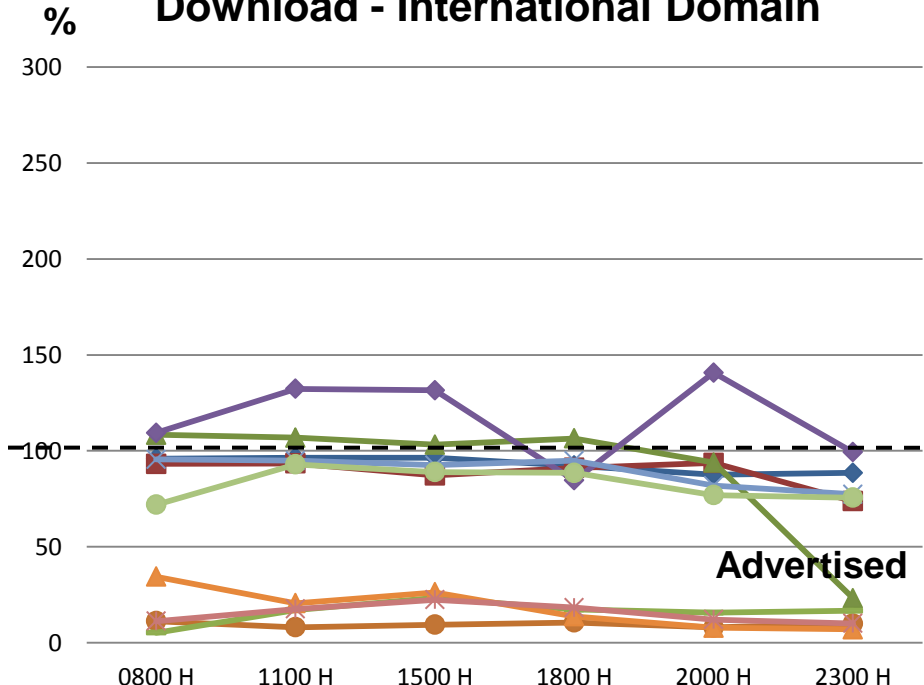


...similarly in mobile BB

Download - ISP Domain



Download - International Domain



- ◆ Banglalion (512kbps)-Dhaka,BD
- ▲ Grameenphone (512kbps)-Dhaka,BD
- Ooredoo Data 99 (7Mbps)-Male,MV
- ▲ PTCL Evo (9.3Mbps)-Karachi,PK
- * Etisalat (7.2Mbps)-Colombo,LK
- Qubee (1Mbps)-Dhaka,BD
- Tata (6.2Mbps)-Chennai,LK
- ◆ Dhiraagu Data 200 (1Mbps)-Male,MV
- * Dialog (2.16Mbps)-Colombo,SL
- Mobitel (3.6Mbps)-Colombo,LK

- ◆ Banglalion (512kbps)-Dhaka,BD
- ▲ Grameenphone (512kbps)-Dhaka,BD
- Ooredoo Data 99 (7Mbps)-Male,MV
- ▲ PTCL Evo (9.3Mbps)-Karachi,PK
- * Etisalat (7.2Mbps)-Colombo,LK
- Qubee (1Mbps)-Dhaka,BD
- Tata (6.2Mbps)-Chennai,LK
- ◆ Dhiraagu Data 200 (1Mbps)-Male,MV
- * Dialog (2.16Mbps)-Colombo,SL
- Mobitel (3.6Mbps)-Colombo,LK



Who should conduct the testing?

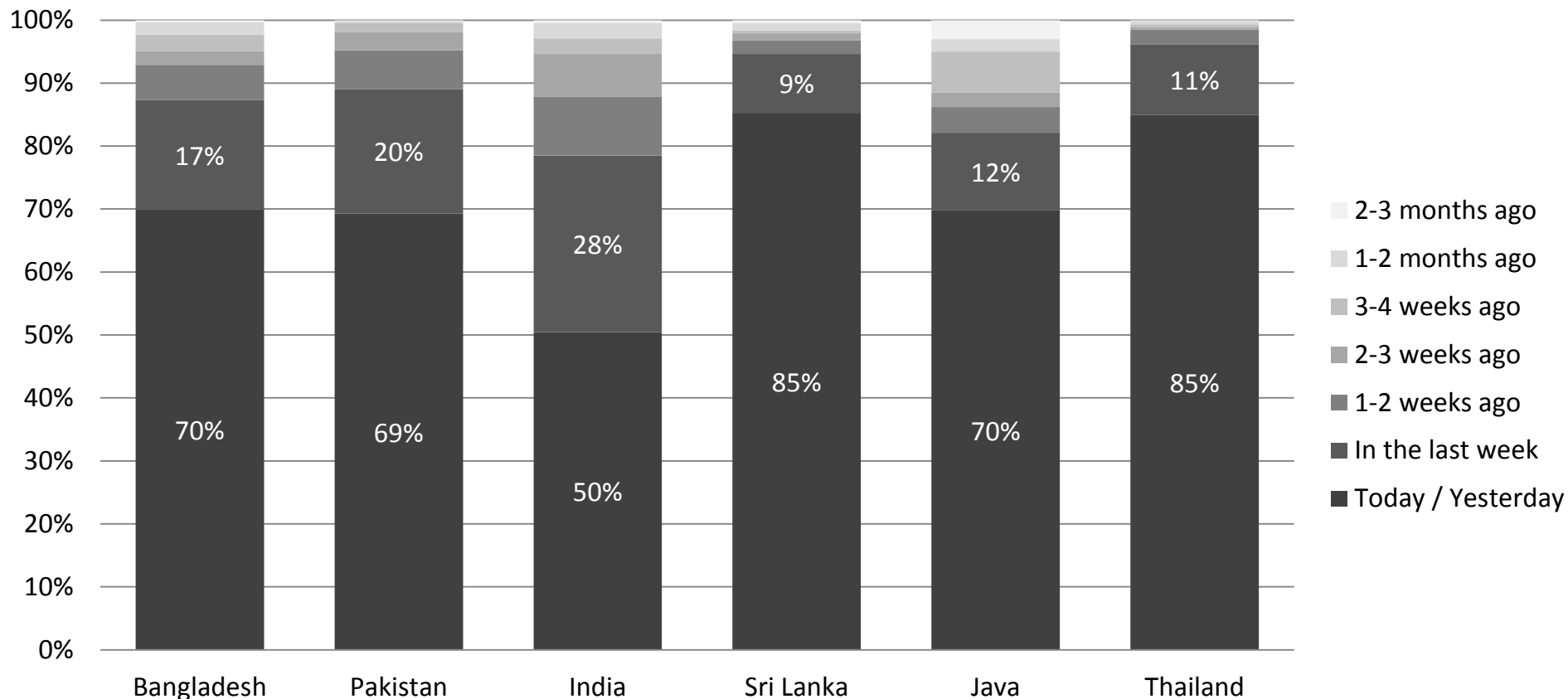
Researcher-organized crowdsourcing for PK?

Diagnostics conducted by	Pros	Cons
Service Providers (ISPs/operators)	<ul style="list-style-type: none">• Easy to implement	<ul style="list-style-type: none">• Results based on equipment placed in the most optimized points of the network• Not representative of the 'actual' speeds
Users	<ul style="list-style-type: none">• Represents actual user experiences	<ul style="list-style-type: none">• Assumes user's PC is virus-free, with no parallel process running etc.• Dependant on user's willingness to participate• Large files impact user's data limits
National Regulatory Authorities (NRAs)	<ul style="list-style-type: none">• In a position to request operator involvement when necessary	<ul style="list-style-type: none">• Known test locations will prompt operators to optimize networks in selected areas

APP ECHO SYSTEM

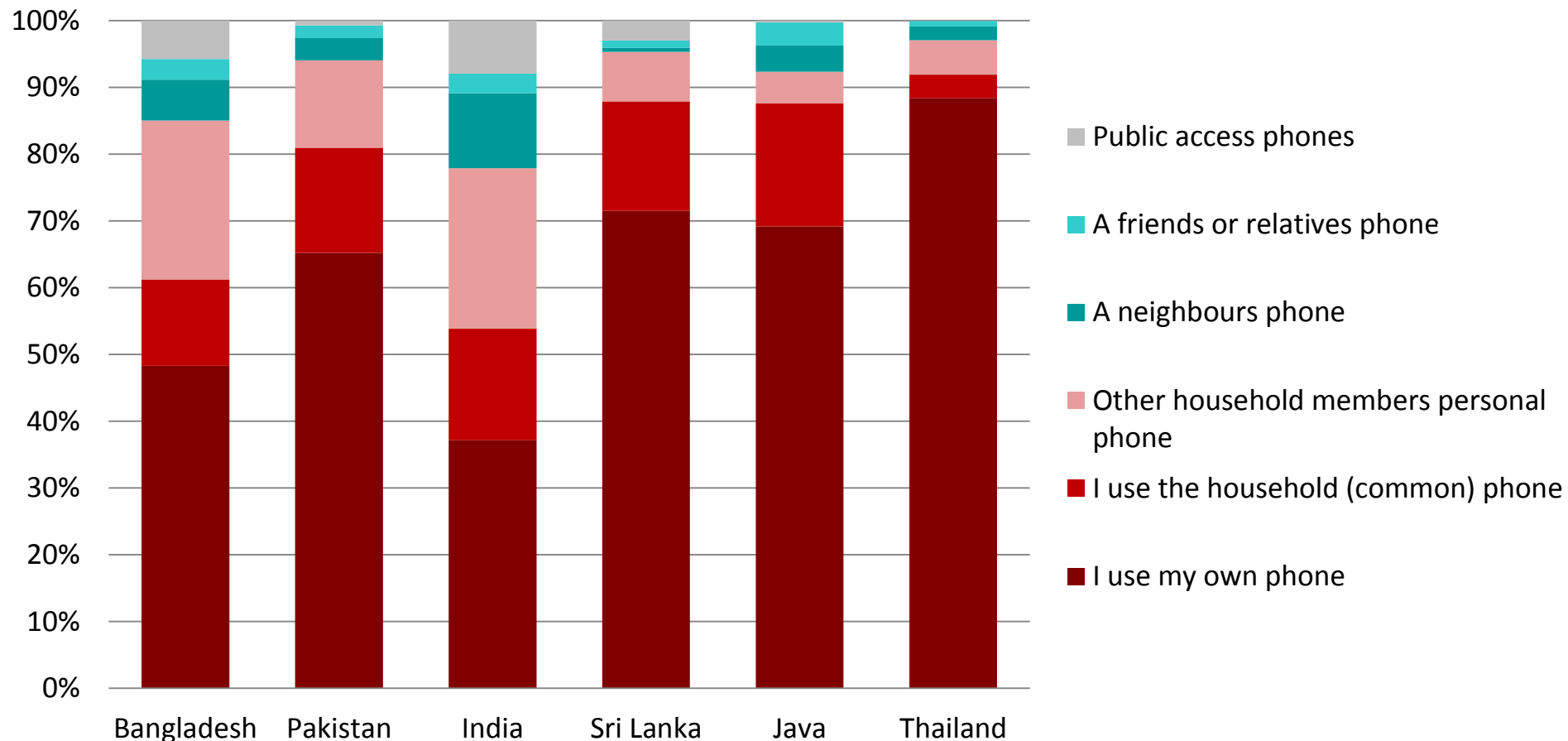
Over 70% of the Bottom of the Pyramid (BOP) has made a call during the last week

Last time respondent used a phone (% of BOP teleusers)



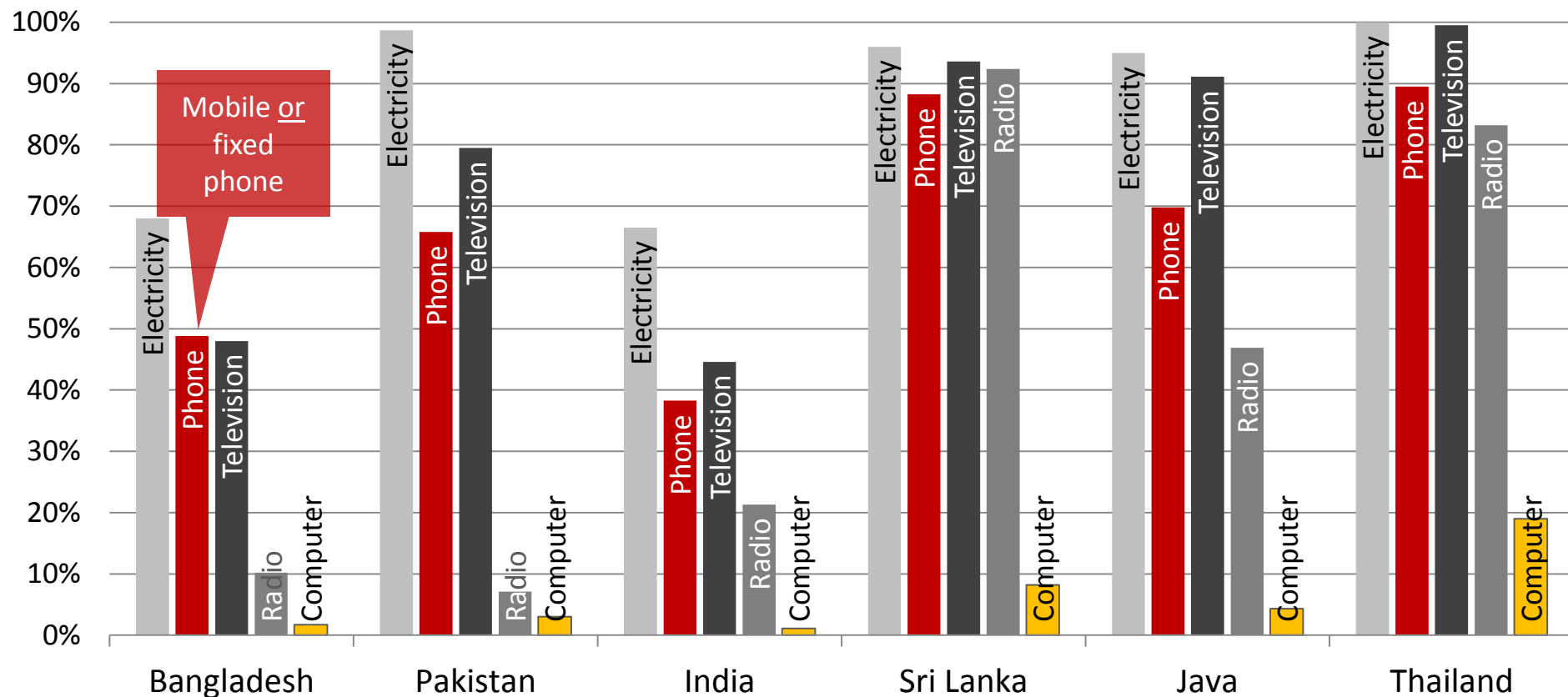
Over 75 % of BOP have access to a phone within the household

Most frequently used phone (% of BOP teleusers)



Phones have overtaken radio at BOP everywhere except Sri Lanka (but some mobiles are used as radios)

Household access (% of BOP teleusers)



But other more-than voice (MTV) use negligible

Among BOP mobile owners

% of BOP mobile owners

	B'desh	Pakistan	India	S'Lanka	Java	Thailand
Make phone calls	100	99	100	99	96	100
Receive phone calls	100	95	99	100	94	99
Send/receive missed calls	86	71	78	65	54	24
Send/receive SMS	19	38	23	55	89	37
Send/receive MMS	1	2	3	5	14	8
Send/receive e-mail				1	3	2
Browse the Internet	3		1	1	10	5
Take photos/video	19	7	8	14	26	19
Play games	27	21	18	11	31	16
Listen to radio	13	15	12	17	26	18
Listen to music	25	5	15	8	26	30
Share that you have content created	1	1	3	2	8	3
Send/receive or download/upload other content	1	1	2	2	6	3
Use as an organizer	7	5	8	2	15	8
Check my bill/credit	13	20	11	18	16	3
Send/receive talk time/load	10	5	2	2	35	0
Access facebook	1			1	7	2
Access other social networking or blog applications					2	1

Apps drive usage. But 'hit' driven.

- Can provide utility, entertainment or emotional value
- But what becomes popular (or a 'killer app' is not predictable
- Government cannot be only developer
 - For some, they can/should be (e.g. eGov services)
- Goal: vibrant market place of apps RELEVANT TO USERS IN PAKISTAN
 - Some apps will survive; some will not

Operators (or others) can help kick-start

- Sri Lanka: Etisalat + hSenid
 - ‘how to write an android app’ free training
 - Test environment for apps (free)
 - 70% revenue to developer
 - Now other operators
- Pakistan: in the right direction
 - E.g. www.purepush.org seems to be successful
 - Incubation for young app developers
 - Office space, business training

Apps need data. Often, real time data

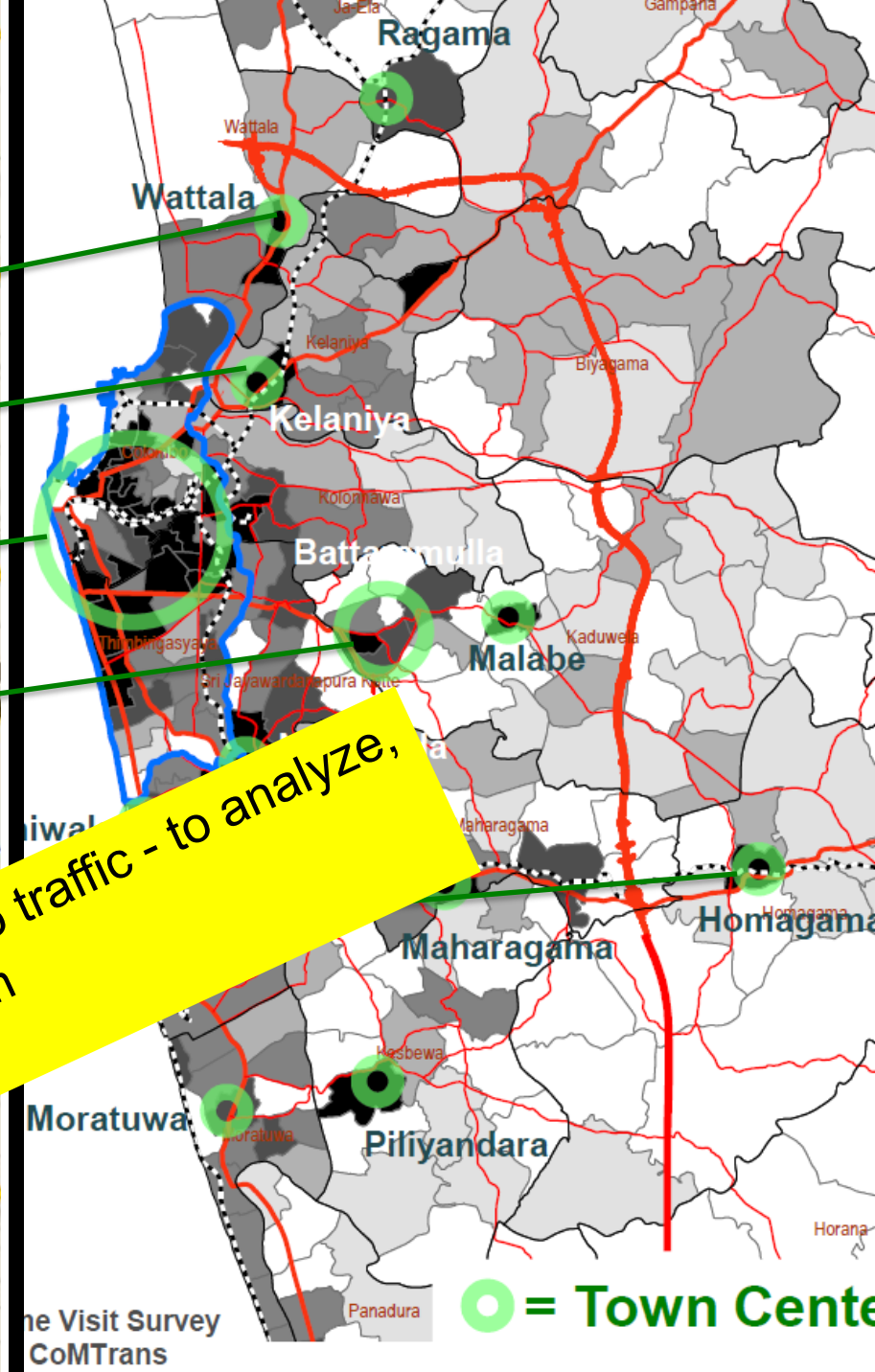
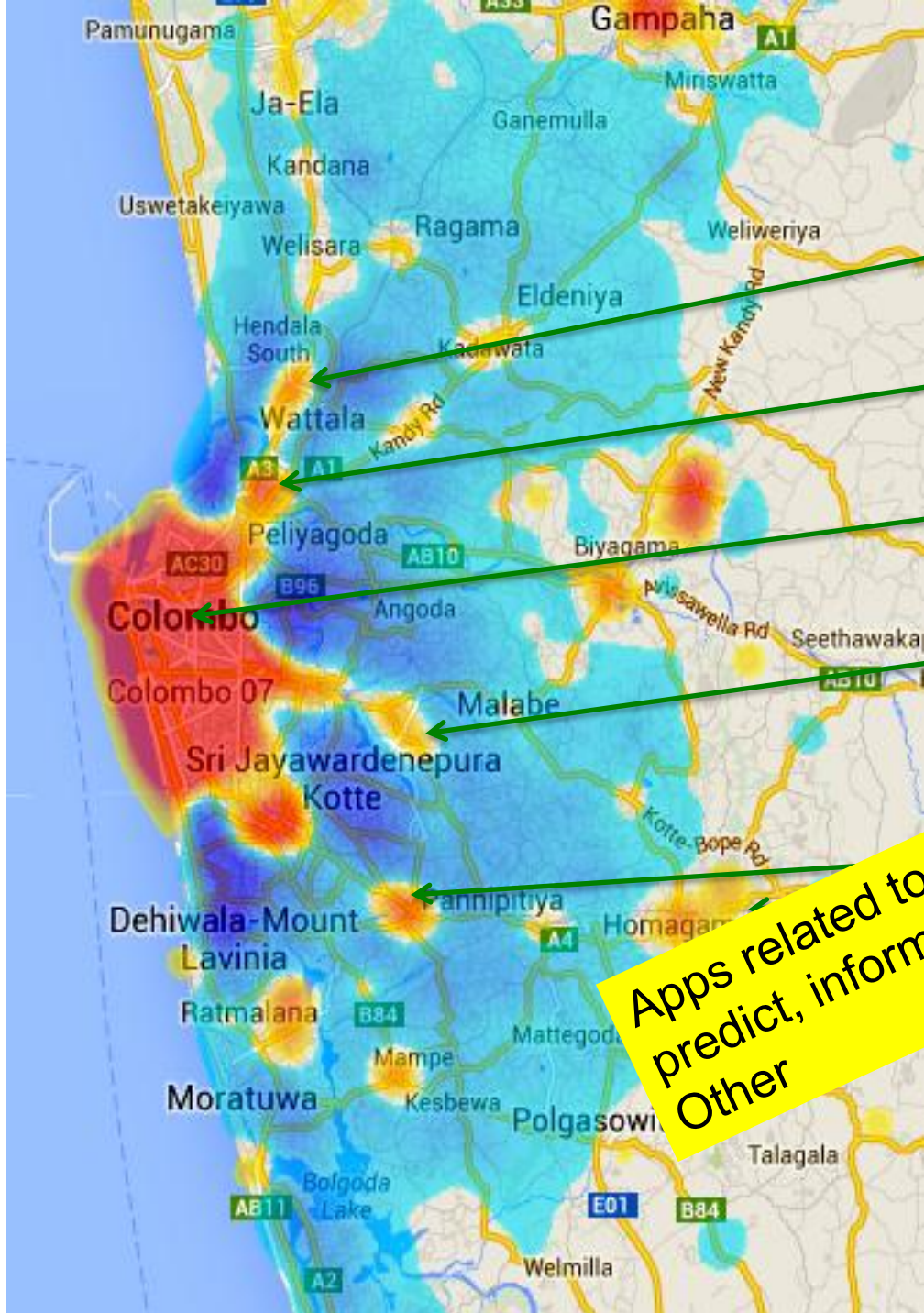
- Horoscopes, music, other entertainment: easier to get raw data, and develop app around the data
- Other apps can be driven by user generated content
 - But hard to create another FB
- Difficult to get data fro physical world
 - Planned power outages; Updated Bus schedules; disease data from Health ministry; agriculture data; official (verifiable) weather data

Governments has data. Digitize, 'datafy', anonymize and release

- Singapore government released all it's electricity data (anonymized)
- E3 Hackathon : to create solutions around energy saving/efficiency
 - By Energy Market Authority in Sep 2013
 - Energy experts, software developers, researchers
 - Prototypes, awards → implementation
- Play/code/learn/innovate

Little digitally consumable data in our countries – except from telcos

- Low credit card and bank penetration
- But high mobile phones
- Call Detail Records (CDRs) useful beyond the telecom sector
 - To solve social problems
- LIRNEasia's big data work
 - Anonymized, historical CDR data
 - Multiple Sri Lankan operators
 - To answer infrastructure related questions



Apps related to traffic - to analyze, predict, inform Other

the Visit Survey
CoMTrans

○ = Town Center

What is the advantage of using mobile network big data for transportation and urban planning?

- It can reduce the need for costly and infrequent transportation surveys
 - You can find out how people actually moved instead of relying on error-prone recall data.
- Can give “real-time” insights on the geo-spatial distribution of citizenry:
 - Where people live, work and congregate
 - Aggregate patterns of population movements over varying temporal scales.

Beyond this example

- Telecom data = digital foot-print of the poor
- Data on re-paid mobile user data
 - To design predictive models to design financial products (accurately predict credit-worthiness)
 - In Brazil
 - Real credit to SMMEs: not asset-based lending
 - Real and sustainable economic development

THANK YOU