



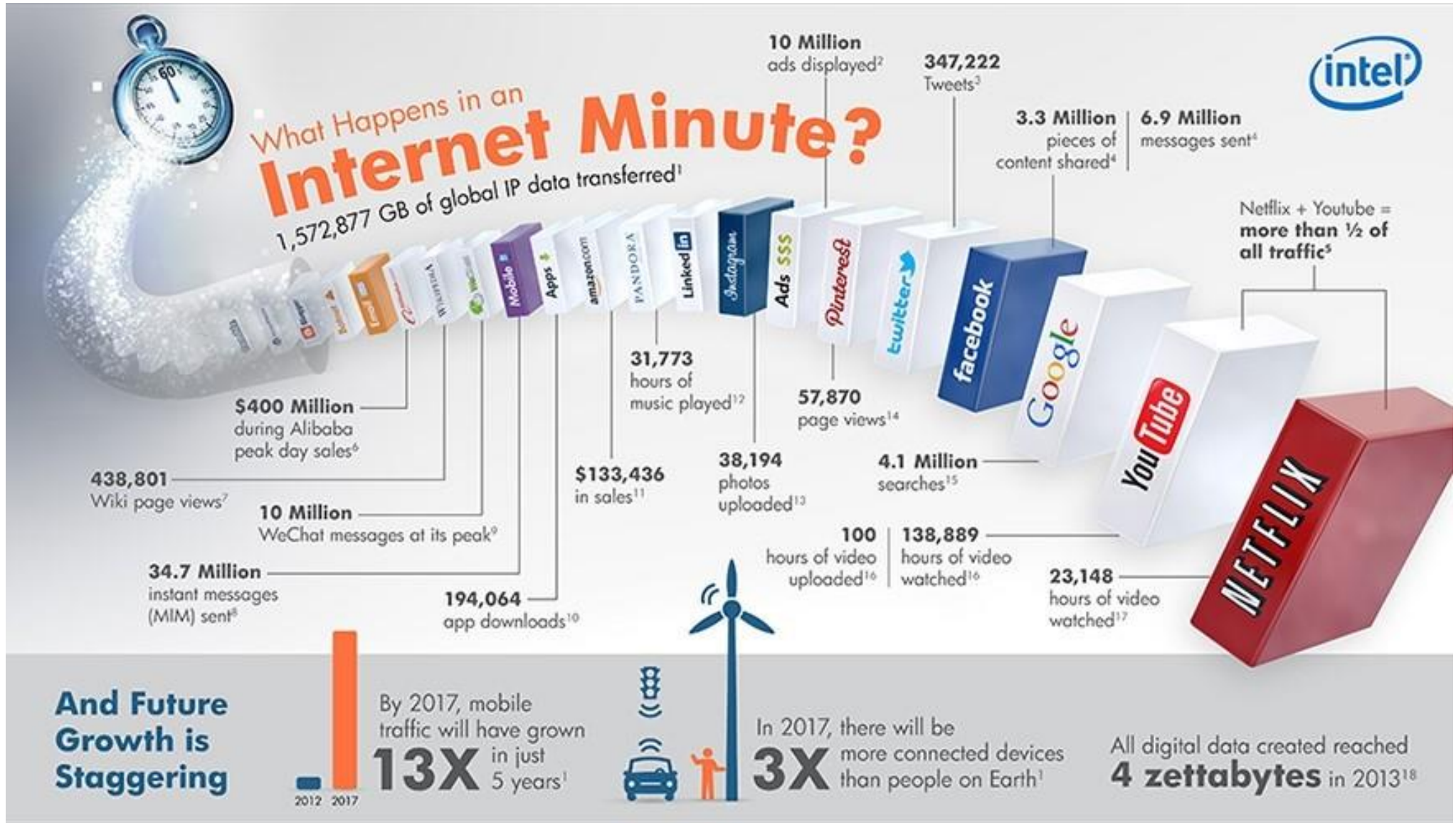
THE INTERNET WEATHER IN ASEAN COUNTRIES

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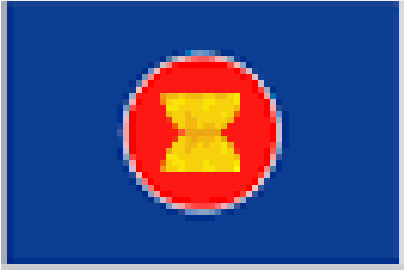
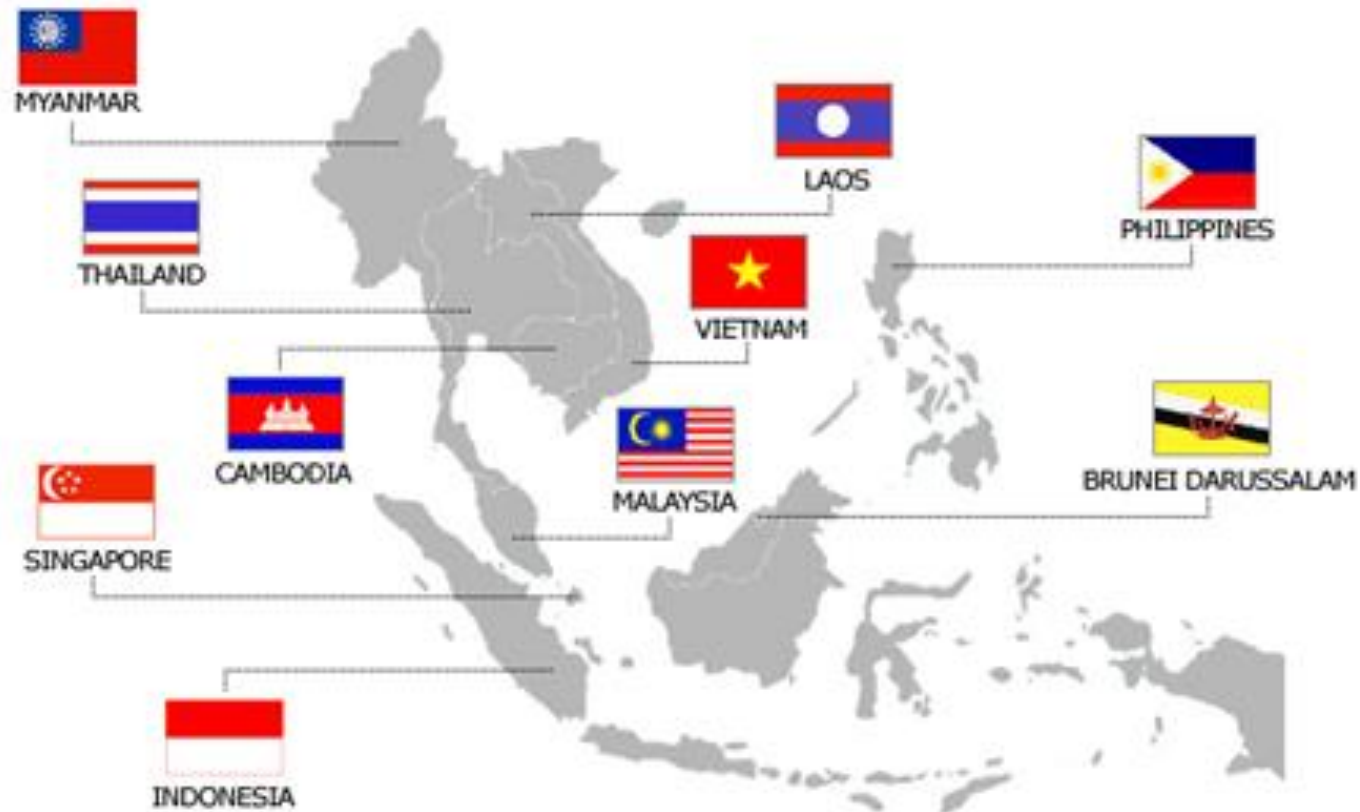
Internet and our Life



Internet and our Life

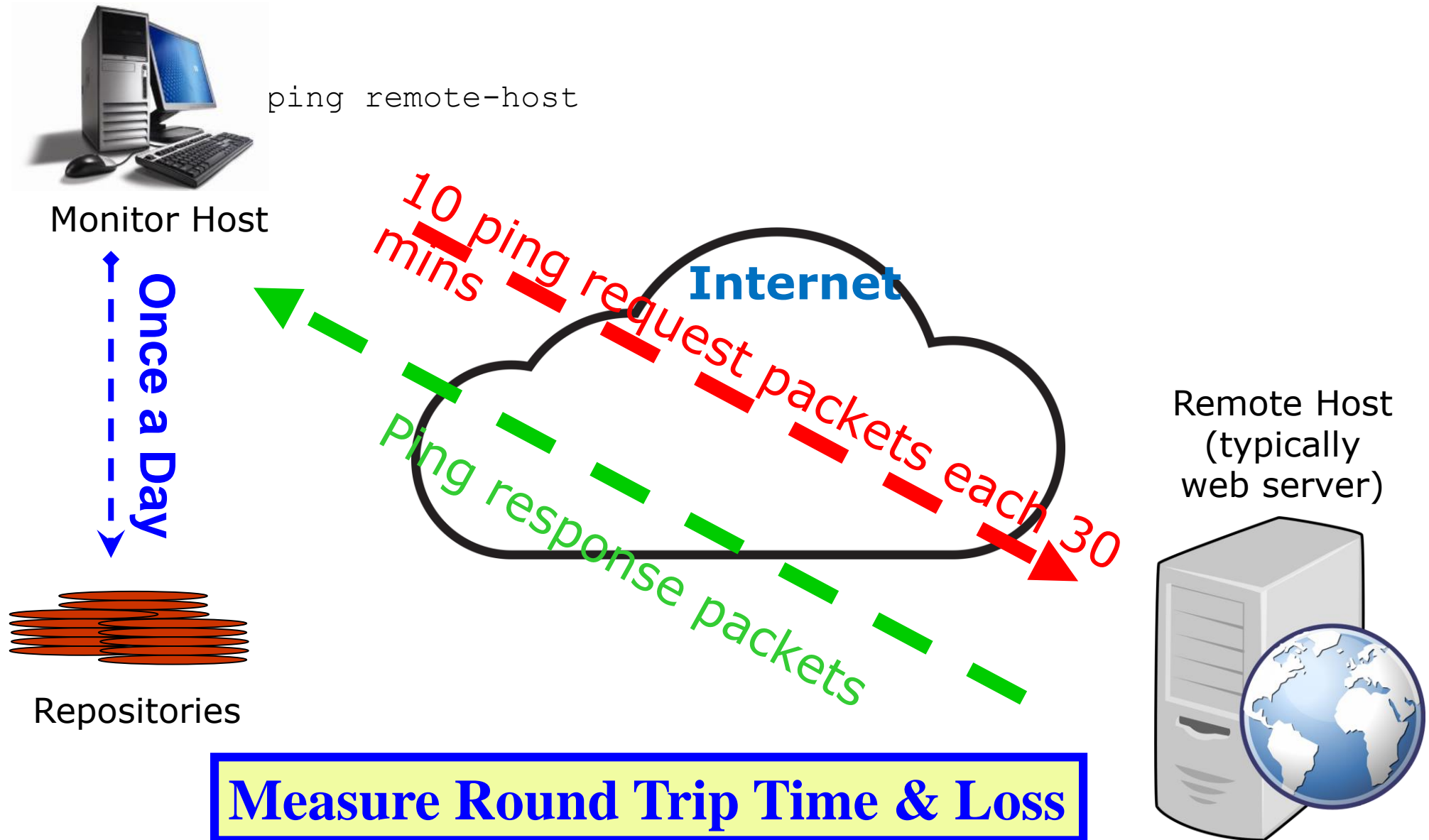


Internet and our Life



The Association of Southeast Asian Nations (ASEAN)

PingER Project



PingER Project

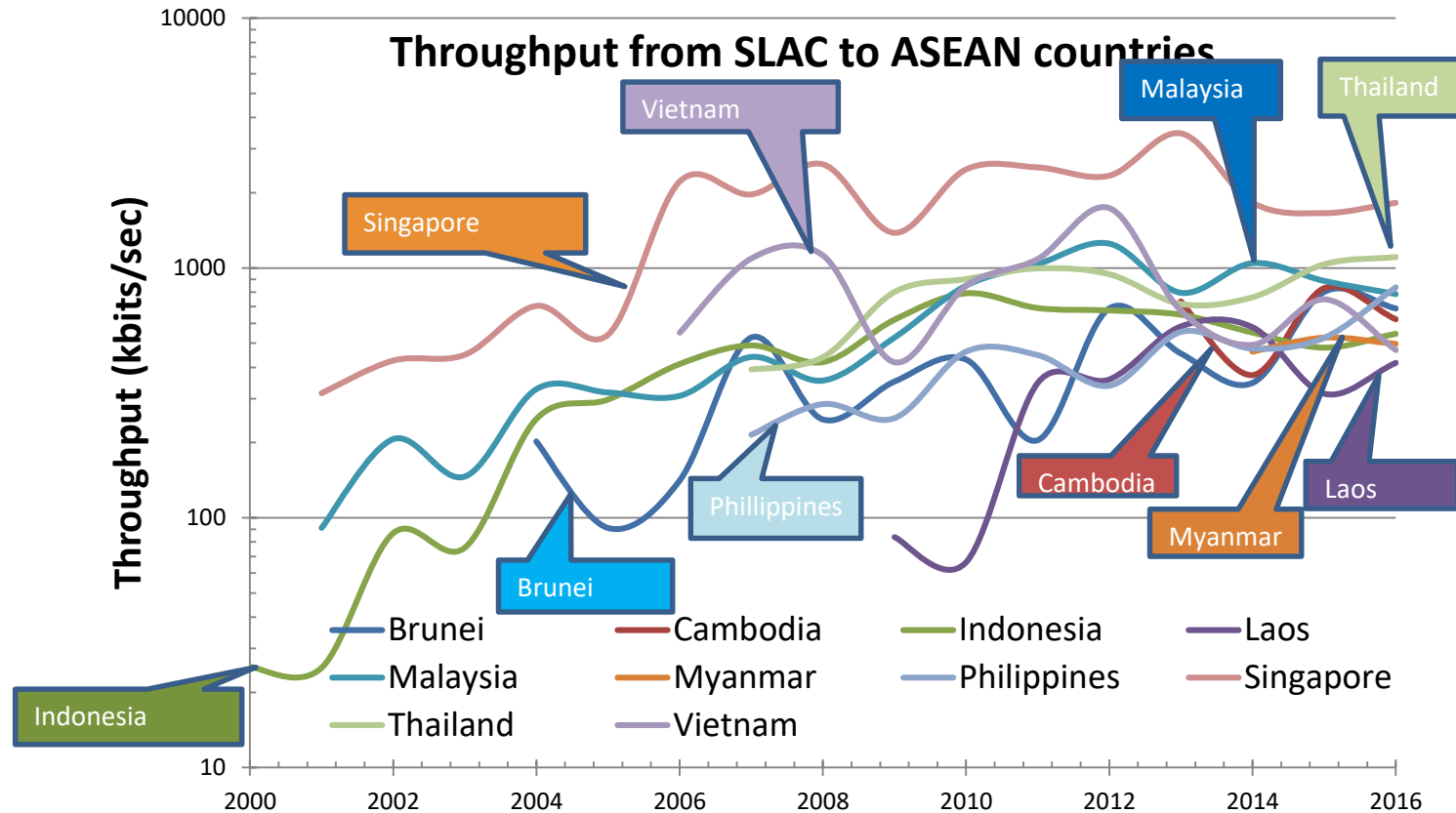
- Monitors ~60 in 23 countries
- Beacons monitored by most monitors (~100)
- Remote sites monitored by some monitors (~750)



Internet Performance

ASEAN Countries

- Singapore
- Thailand, Malaysia and The Philippines
- Lowest performance: Laos & Myanmar

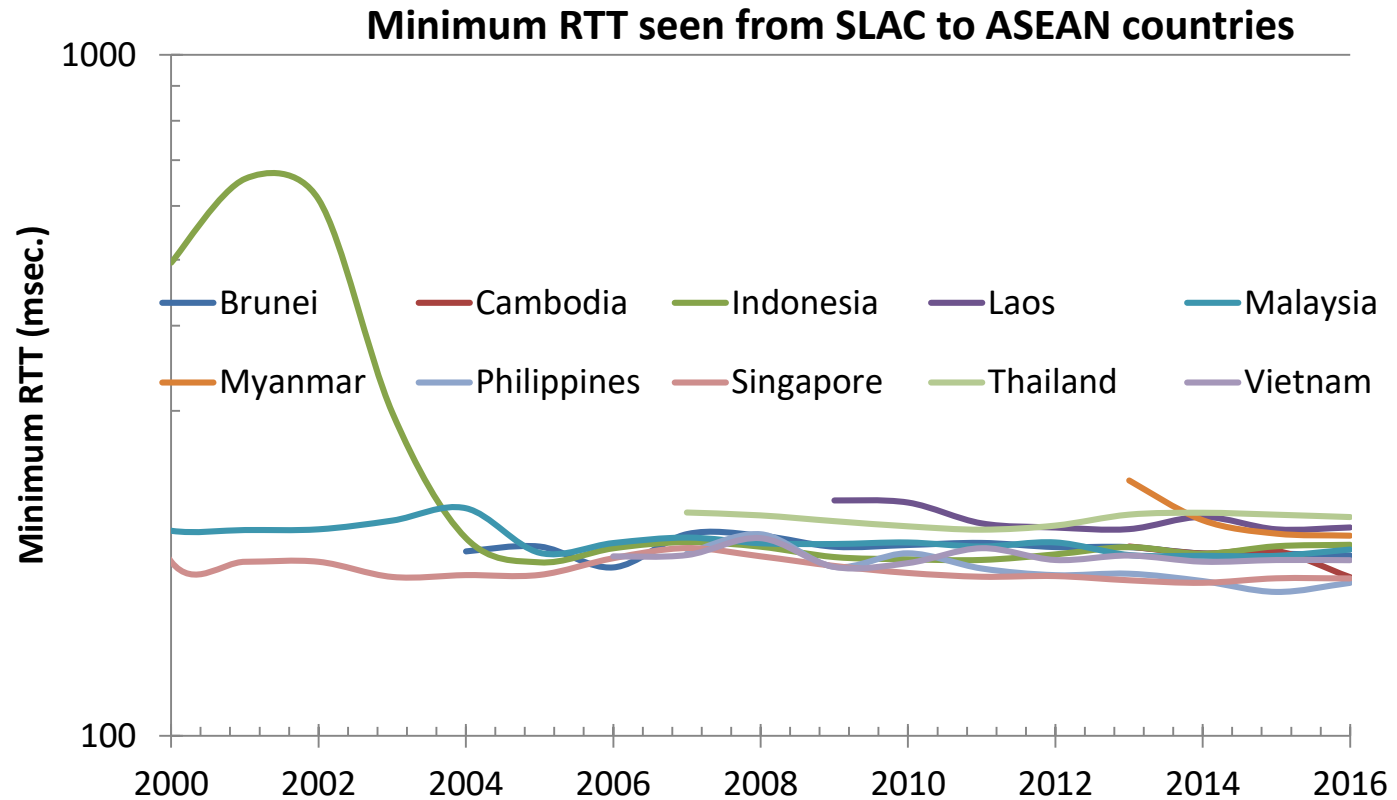


Derived throughput $\sim 8 * 1460 / (RTT * \text{sqrt}(\text{loss}))$
Mathis et. al

Internet Performance

ASEAN Countries

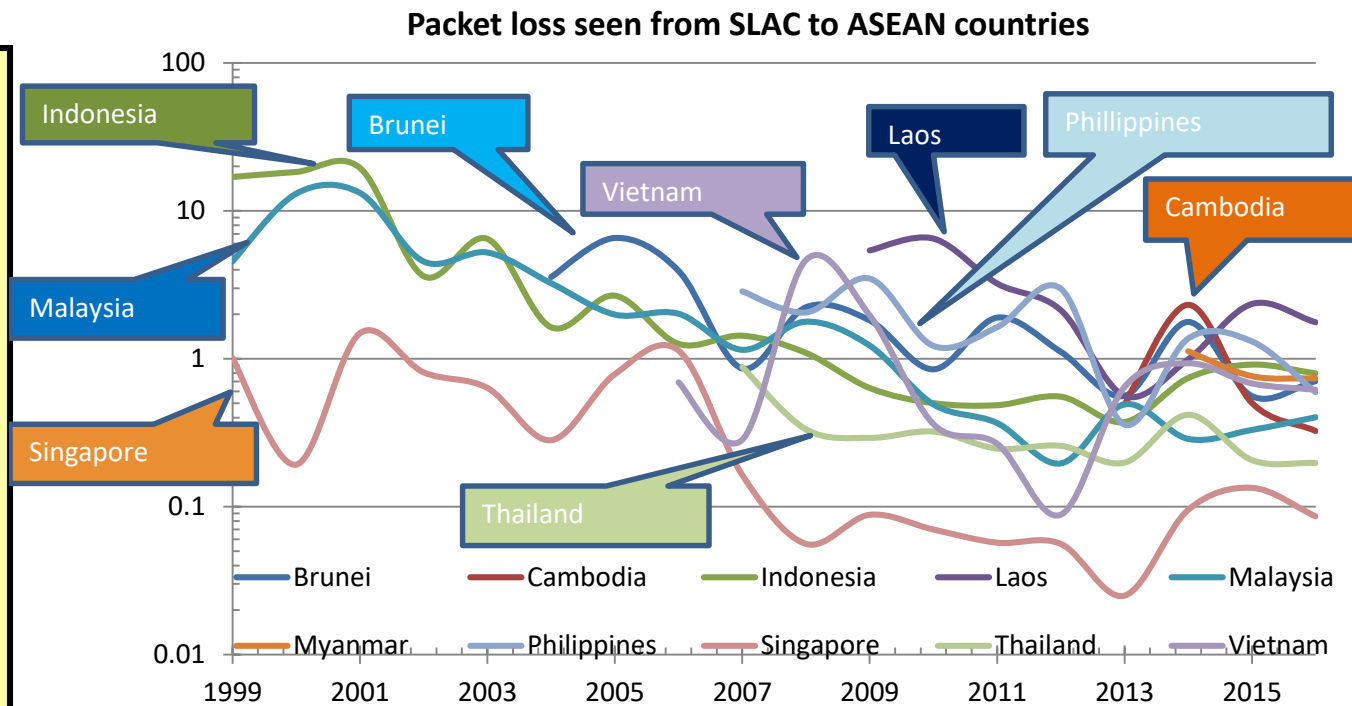
- **Lowest: Singapore, The Philippines**
- **Highest: Thailand, Laos, and Myanmar**



Internet Performance

- Low losses are good.
- Losses are mainly at the edge, so distance independent
- Losses are improving (decreasing exponentially)

- Best <0.1%: Singapore
- 0.1%-<1%: Malaysia, Thailand
- Worst > 1%: Laos



Internet Performance

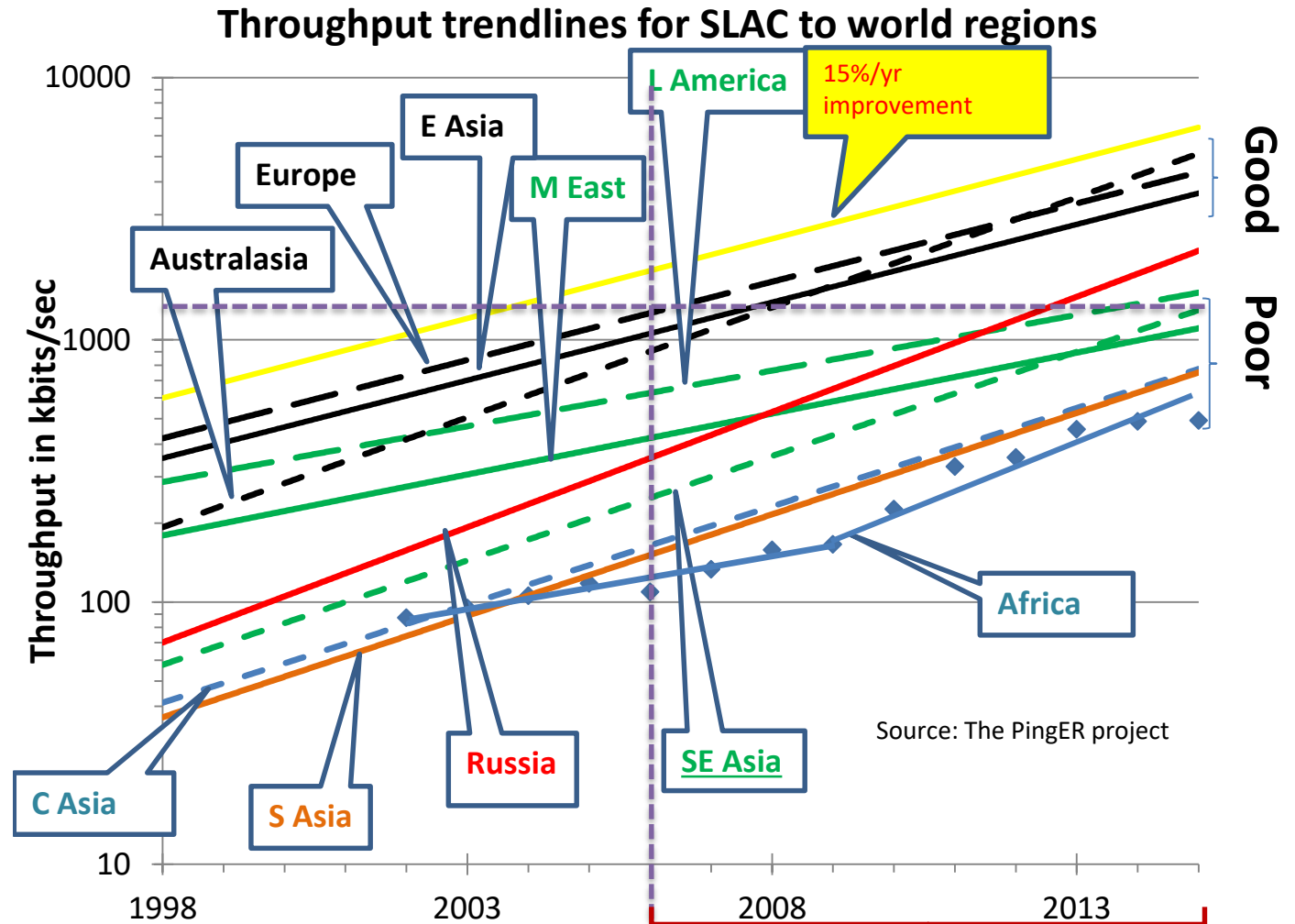
Top 4
 Europe, N. America,
 East Asia & Australasia

Behind Europe
 5-6 yrs: Russia, L America,
 M East

9 yrs: SE Asia

12-14 yrs: India, C. Asia

18 yrs: Africa

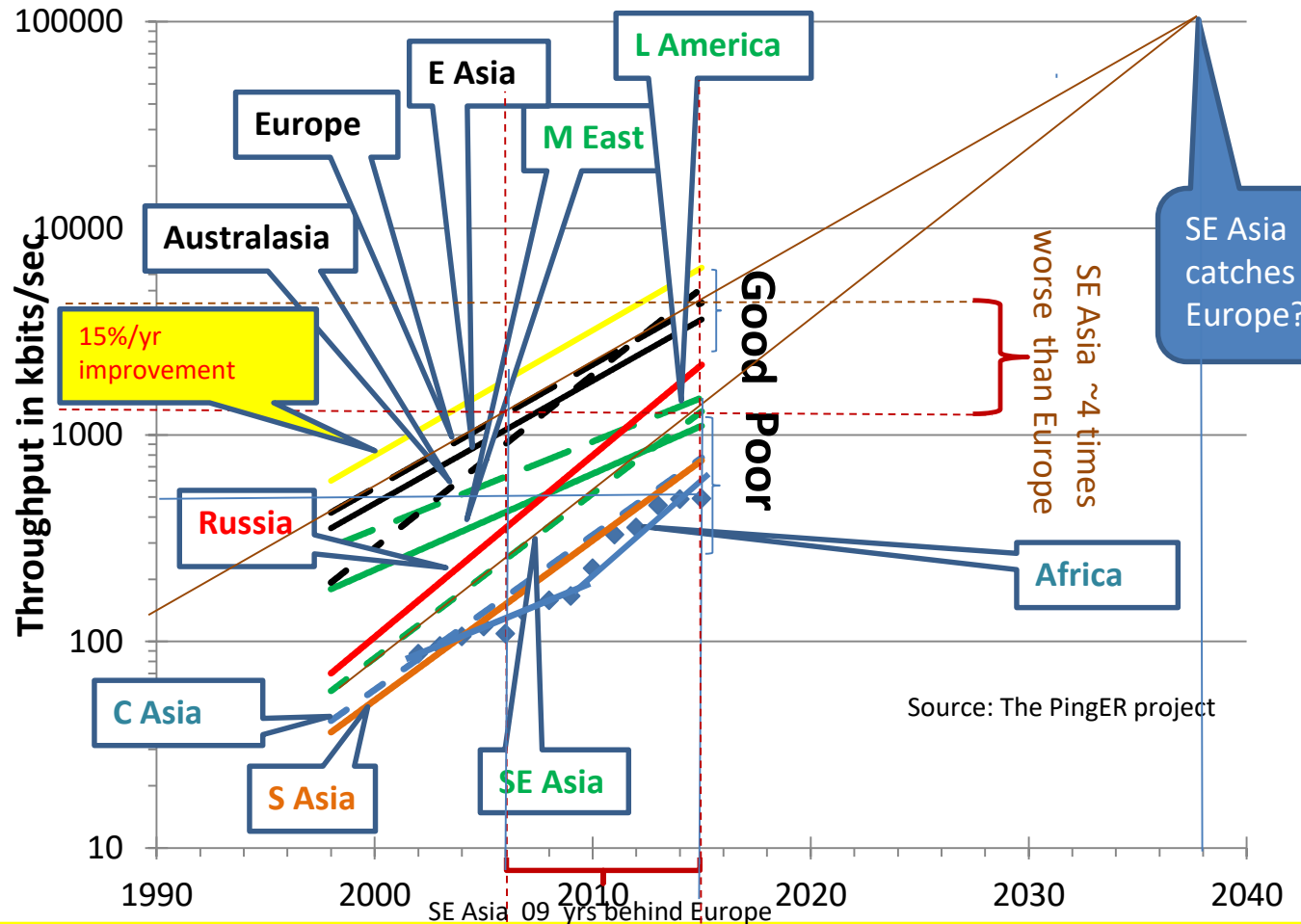


SE Asia 09 yrs behind Europe

Jan 2006

Internet Performance

Throughput trendlines for SLAC to world regions



Top 4

Europe, N. America,
East Asia & Australasia

Behind Europe

5 -9 Yrs: Russia, Latin
America, Middle East,
Southeast Asia

12-14 Yrs: So+Central Asia

16 Years: Africa

In 10 years: Russia and Latin America may catch up with top 4.

Africa was falling farther behind; *new cables made a difference since 2010; now slowing down once again, catchup in 2013 was 2030, now 2040.*

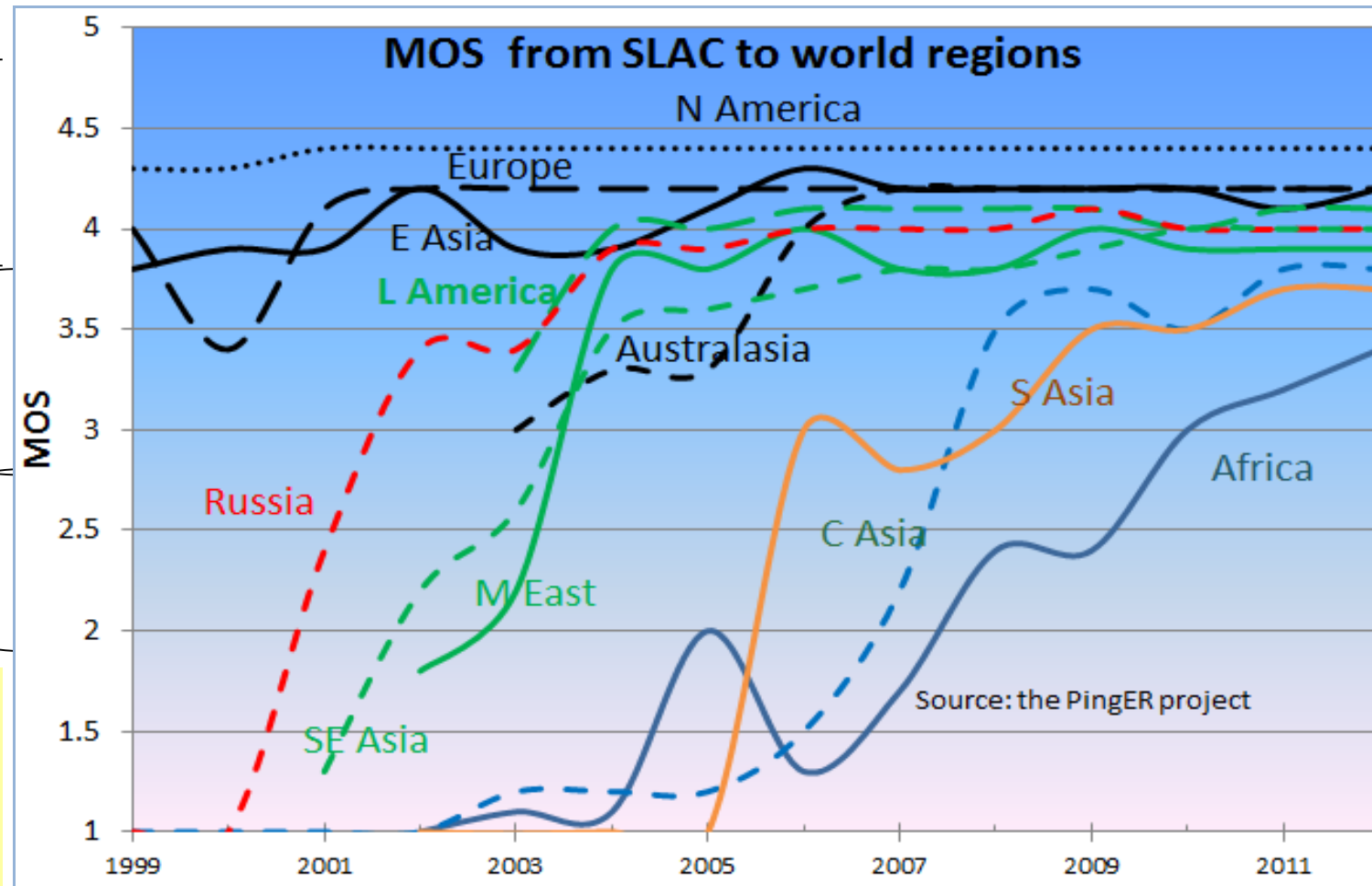
S.E. Asia are catching up slowly

Mean Opinion Score (MOS)

- ITU metric, based on quality of a conversation
 - Originally people listen and give quality 1-5

- ≥ 4 is good,
- 3-4 is fair,
- 2-3 is poor.

Usable



Important for
VoIP

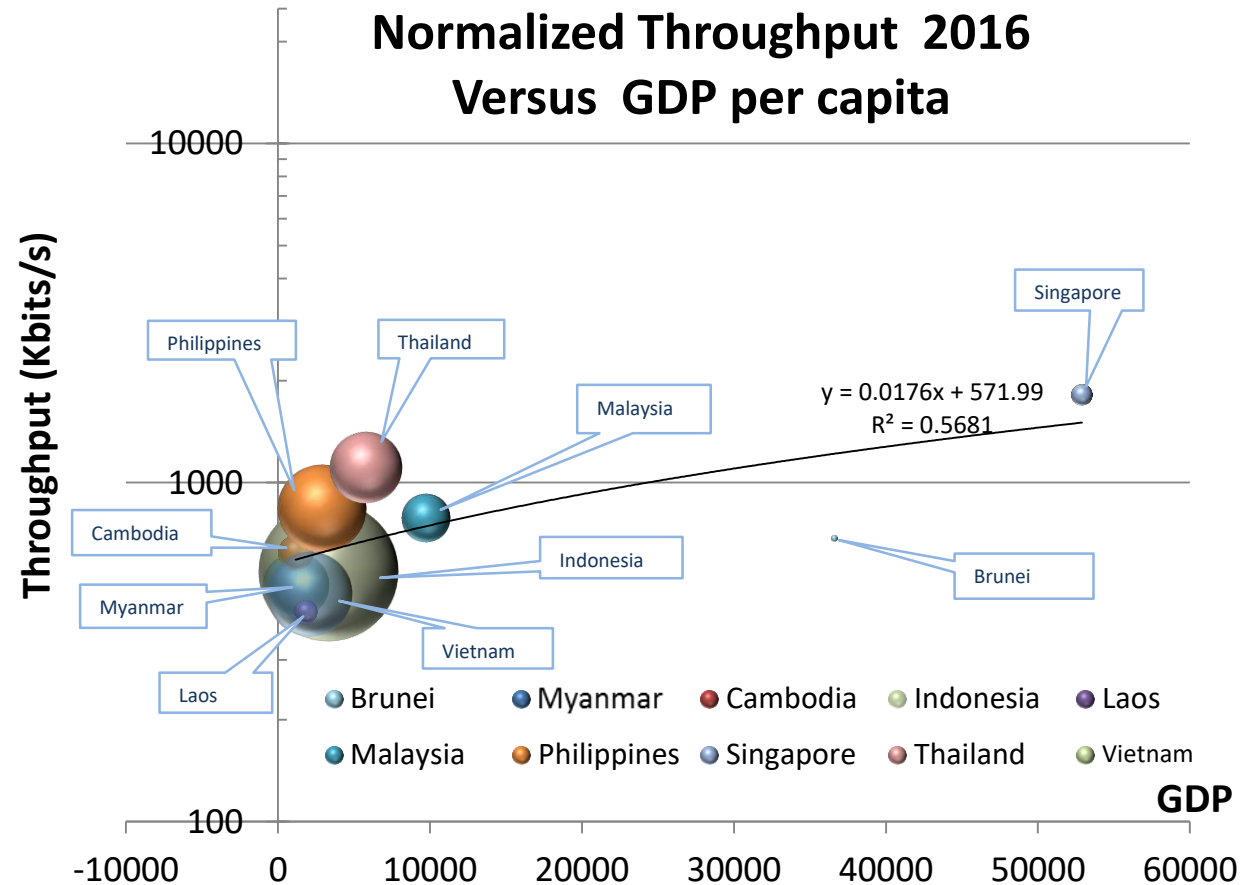
How does the Internet assist development?

- Investment in information technology plays the role of a **"facilitator"**
- World Bank / IFC report: for every **10% increase in high-speed Internet connections** there is an increase in economic growth of **1.3 percentage points**.
- A study reported by Akamai showed that **80 new jobs are created for every 1,000 new broadband connections**

How does the Internet assist development?

ITU GDP:

- ◆ well-being, living standards and the growth of the economy
- ◆ distinguish whether a country is developed, developing, or under developed
- ◆ indicate the impact of economic policies on the quality of life

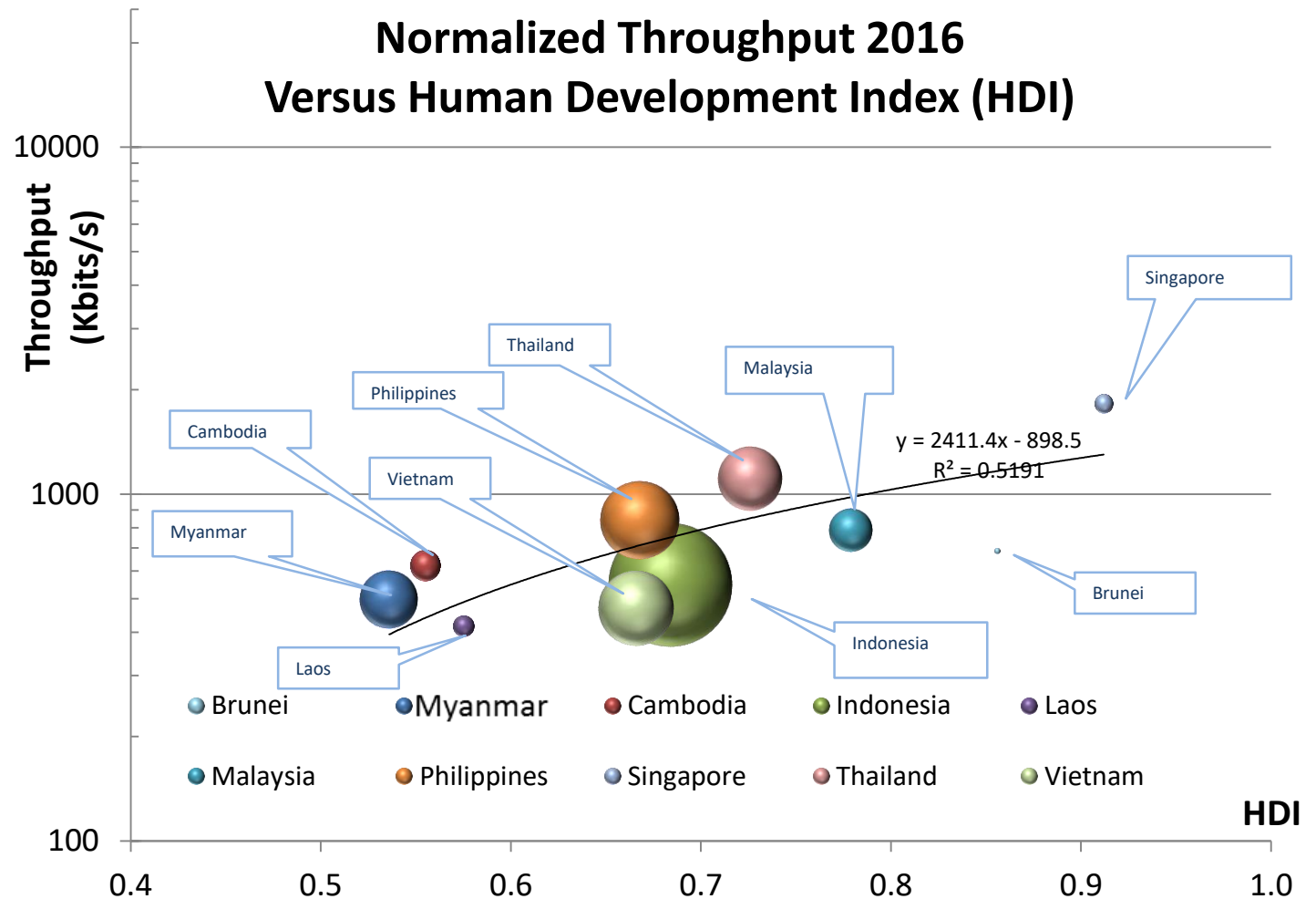


A Clear Correlation Between the GDP per capita and the Throughput

How does the Internet assist development?

UNDP HDI:

- ◆ **A long and healthy life**, as measured by life expectancy at birth
- ◆ **Knowledge** as measured by the adult literacy rate (with 2/3 weight) and the combined primary, secondary and tertiary growth enrollment ratio (with 1/3 weight)
- ◆ **A decent standard of living**, as measured by GDP per capita



A Clear Correlation Between the UNDP HDI and the Throughput

How does the Internet assist development?

ITU IDI:

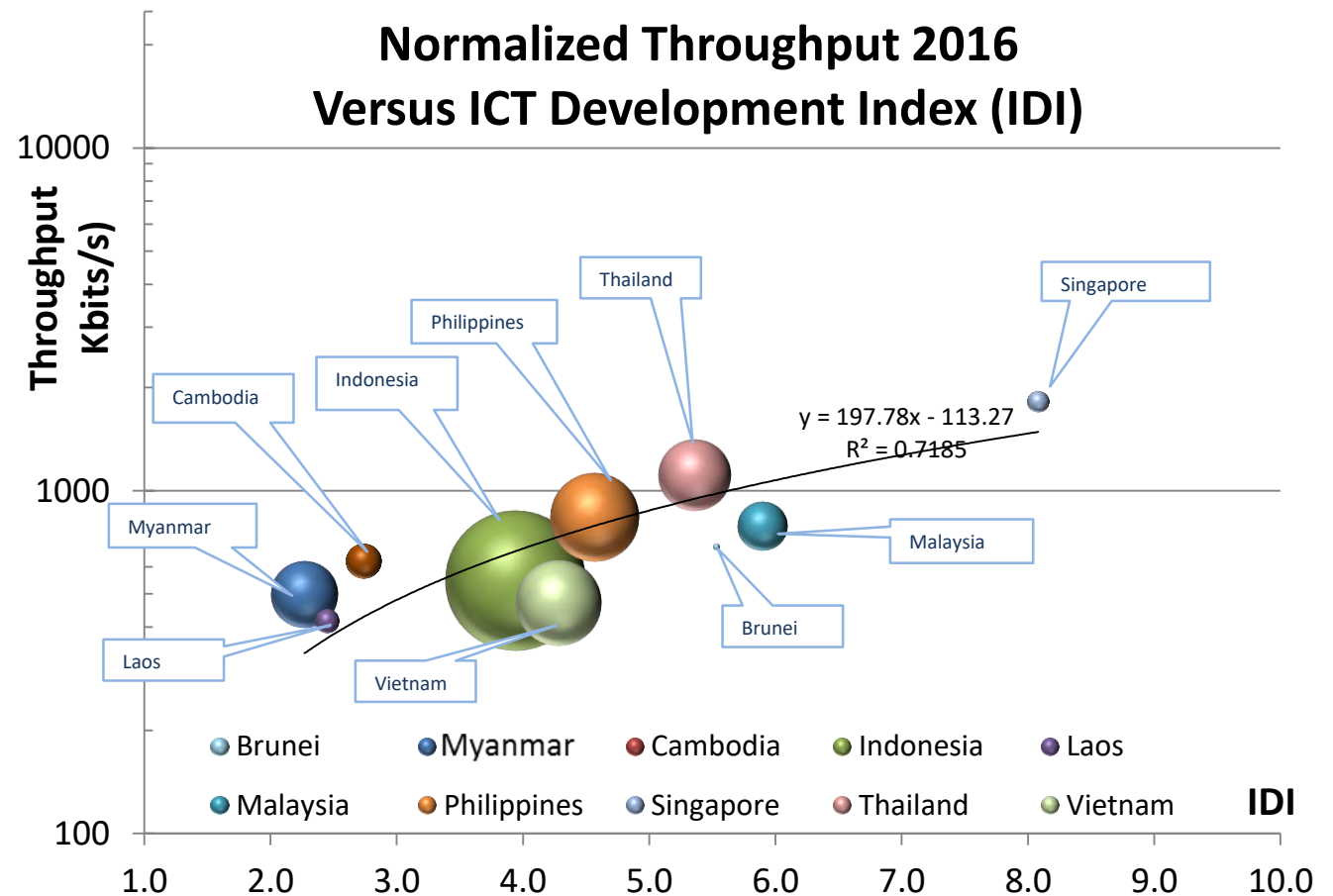
◆ IDI = ICT readiness + usage + skills

Readiness (infrastructure access)
 phone (cell & fixed) subscriptions, international BW, %households with computers, and % households with Internet access

Usage (intensity of current usage)
 % population are Internet users, %mobile, and fixed broadband users

Skills (capability)
 Literacy, secondary & tertiary education

◆ Top right = Good

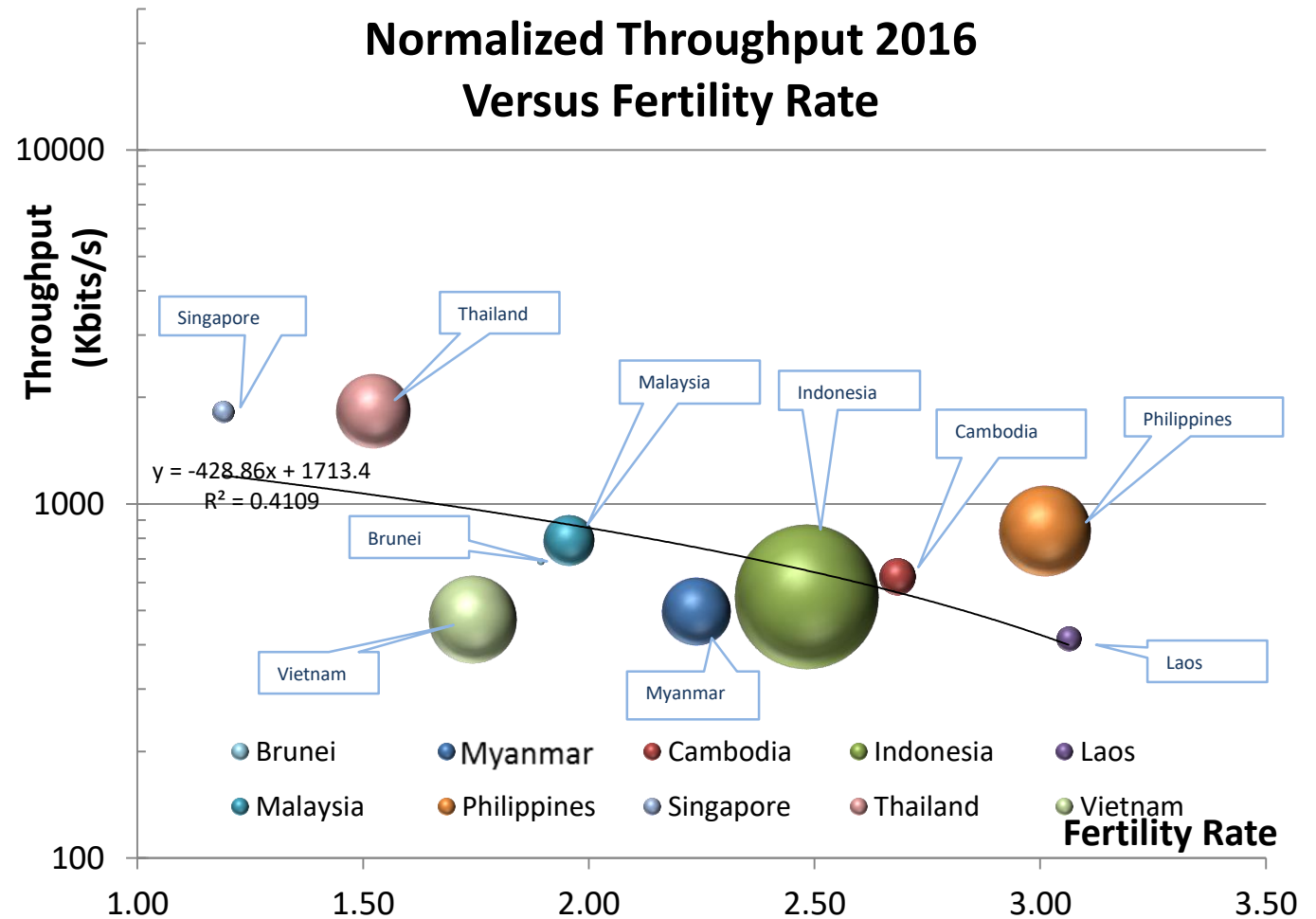


Positive Correlation Between the IDI and the Throughput

How does the Internet assist development?

Fertility Rates:

- ◆ **children born** by a woman in a given country
- ◆ the world's population will increase from today's 7.3 billion people to 9.7 billion in 2050 and 11.2 billion at century's end.
- ◆ achieving significant fertility declines requires education and easy access to information
- ◆ **Internet a major enabler**

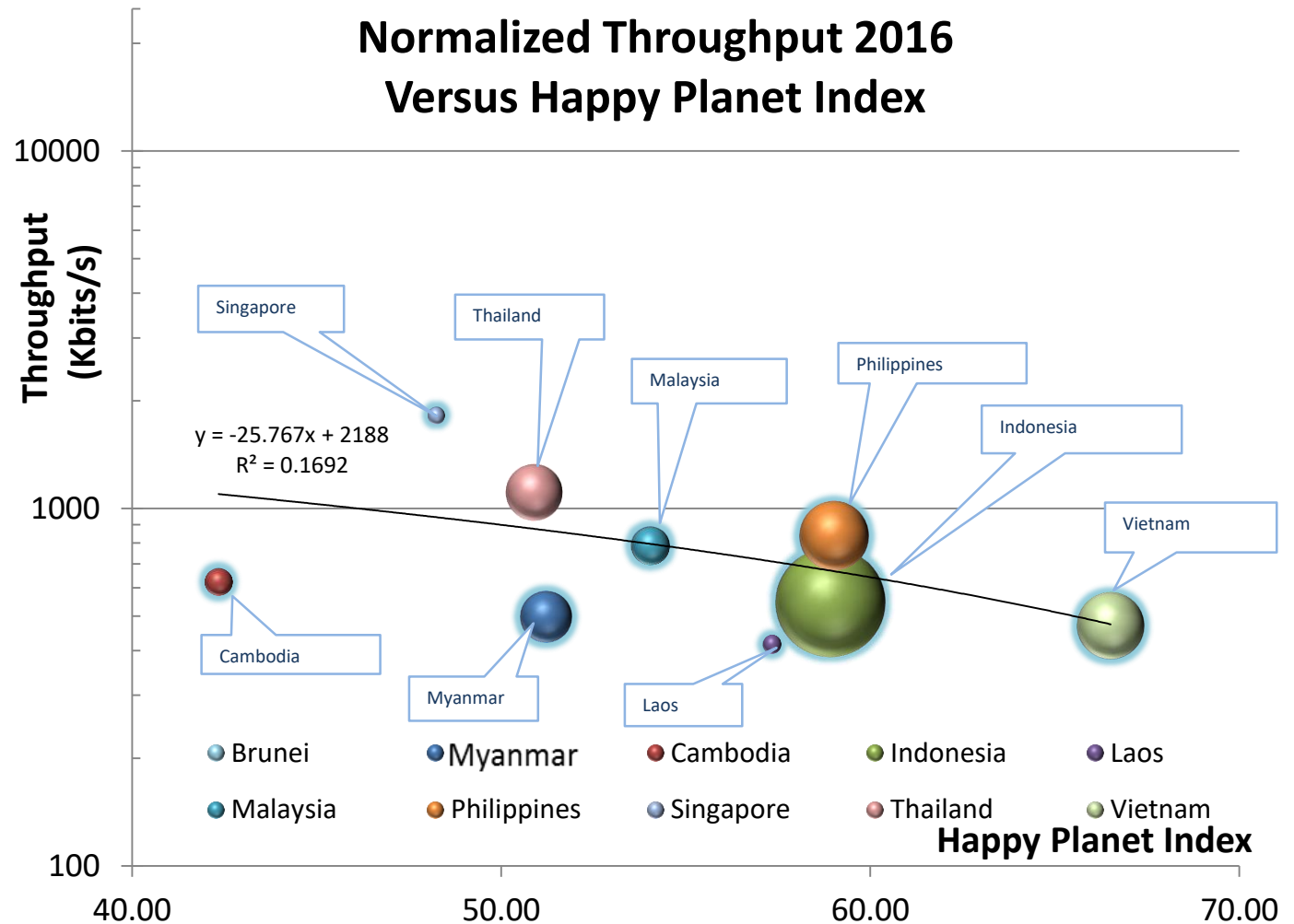


- Negative Correlation Between the Fertility Rate and the Throughput

How does the Internet assist development?

HPI:

- ◆ new index of human wellbeing and environmental impact
- ◆ how well nations are doing at achieving long, happy, sustainable lives



_A weak negative Correlation BTW HPI and the Throughput

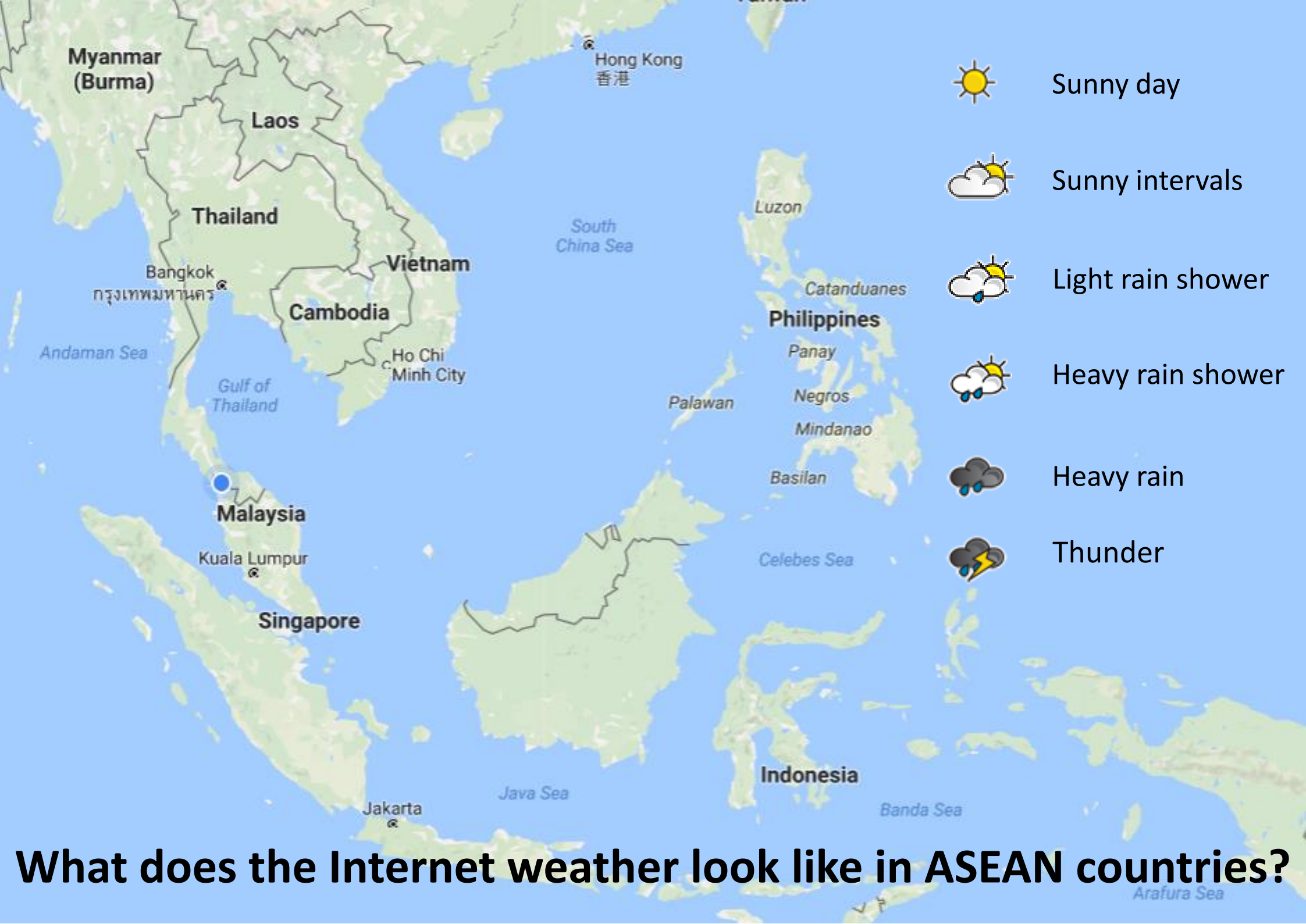
What Is Next

- Facebook & Google believe they have a real shot at connecting the 57% of the world's population still offline.
- The **Google balLoon** project being developed with the mission of providing Internet access to rural and remote areas.,
- Facebook's Connectivity Lab is building drones, satellites and lasers to deliver the Internet to everyone
- The higher performance of the Facebook laser transmitting drones may eventually supecede the wireless transmissions of the Google balloons.



What Is Next

- Join PingER team and let's work together to study Internet performance in ASEAN countries:
 - Identifying last mile problems
 - Noisy (jitter & loss)
 - Very indirect connections
 - Discovering poor routing
 - Identified and quantified rates of improvement for countries /regions
 - Evaluating the impact of:
 - Major cable cuts,
 - Earthquakes, tsunamis
 - Upgrades (GEOS to terrestrial)



Sunny day



Sunny intervals



Light rain shower



Heavy rain shower



Heavy rain



Thunder

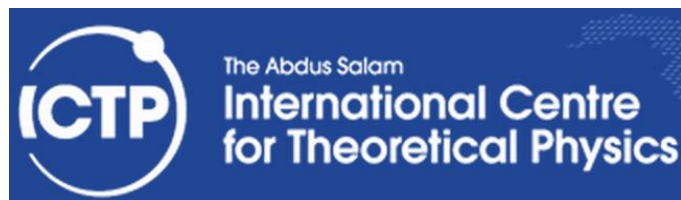
What does the Internet weather look like in ASEAN countries?



Thank You

ขอขอบคุณ

Khop khun khap



PingER Project

