ADVANCING THE PHILIPPINES' INTERNET INFRASTRUCTURE

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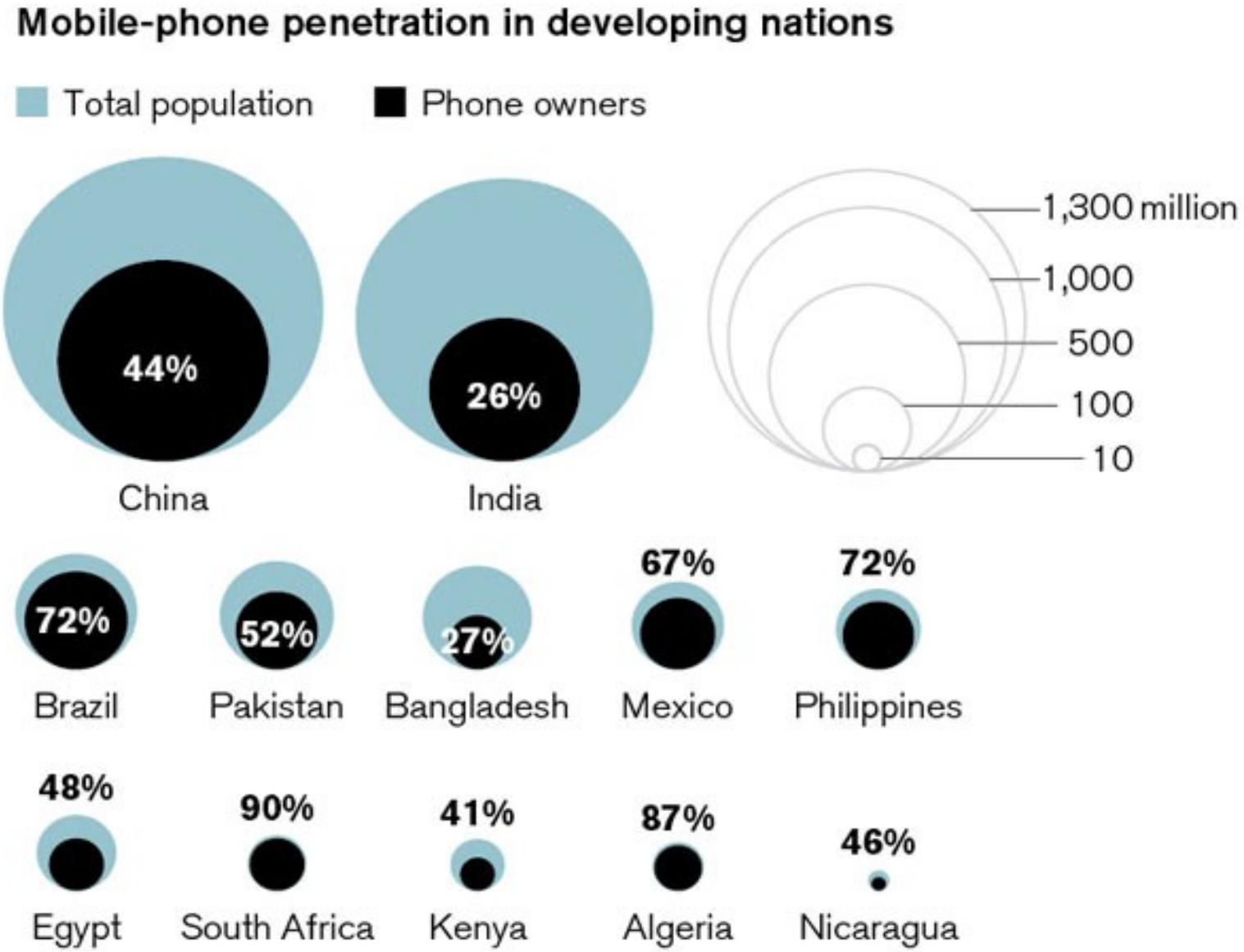
Presentation agenda

- **Philippine Internet Infrastructure (PII)**
  - *Selected indicators/observations:*
    - **Telecoms and Value-Added Services**
    - **Current/Emerging Mainstream Applications**
- **PII components that need improvement**
  - *"last mile"*
    - **Broadband Access**
  - *"middle mile"*
    - **IXP**
    - **CDN**

HOW?



From an article in MIT Technical Review, November/December 2008.

Internet vs. Phone

WORLD BANK INDICATORS	INTERNET vs FIXED-LINE+MOBILE PHONE			
(2 of 54 items)	Row 1 = Internet users per 100 people			
	Row 2 = Fixed-line + Mobile phone per 100 people			
POPULATION GROUPING				
	2001	2005	2006	2007
WORLD (227 countries)	***8***	***16***	***19***	***23***
	32	54	62	69
HIGH INCOME	***37***	***55***	***59***	***64***
	116	138	144	146
UPPER MIDDLE INCOME	***6***	***18***	***22***	***27***
	38	82	95	106
MIDDLE INCOME	***3***	***9***	***13***	***18***
	20	46	55	63
LOWER MIDDLE INCOME	***2***	***7***	***10***	***16***
	16	38	45	53
LOW INCOME	***0***	***3***	***4***	***5***
	2	10	17	27
EAST ASIA + PACIFIC	***3***	***8***	***10***	***14***
	21	50	57	65
PHILIPPINES	***3***	***5***	***6***	***6***
	20	45	54	60+

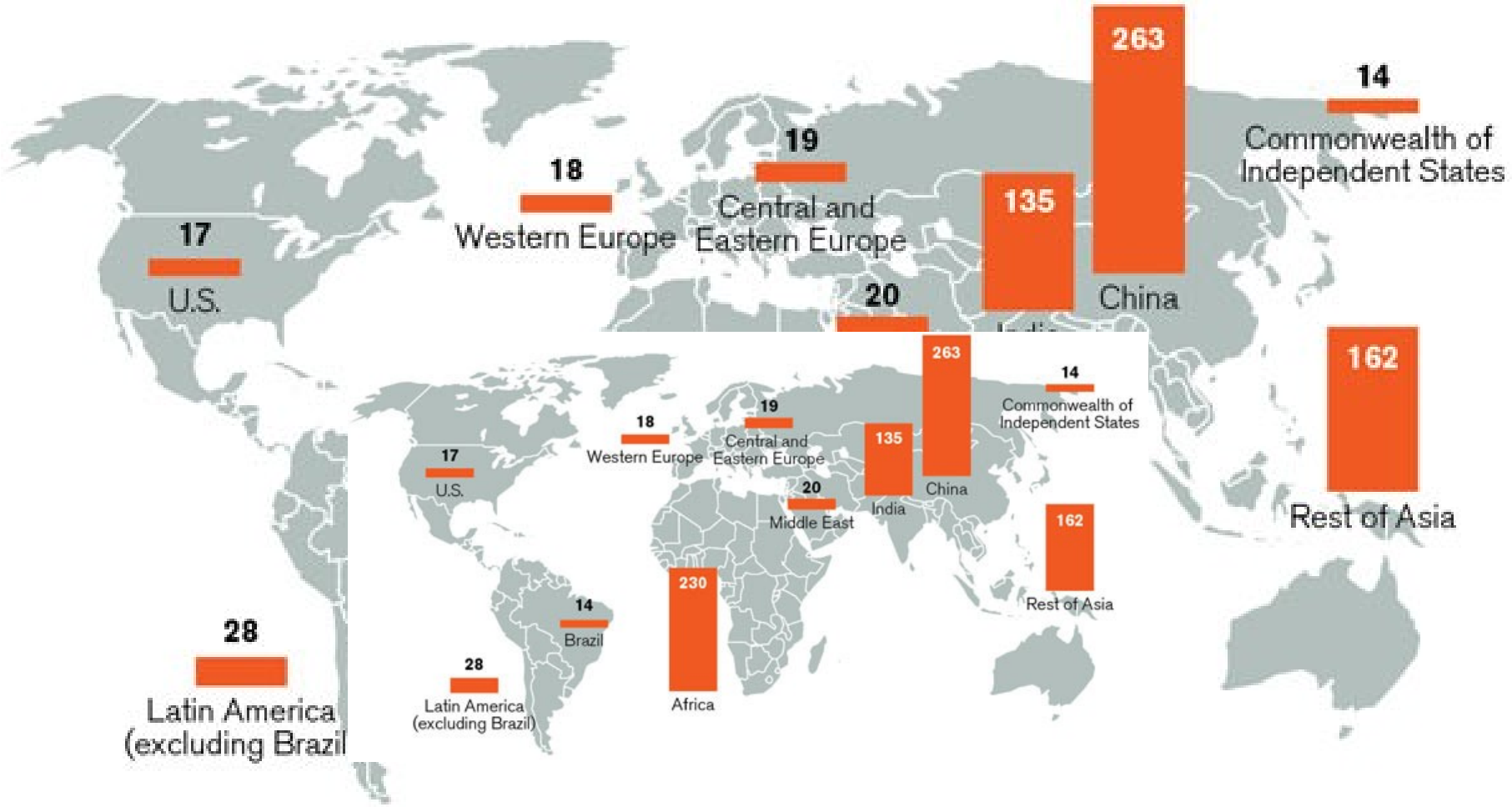
Mobile phone/Internet penetration vs. Average per capita income

- 1% increase in mobile phones

  ➔ 4.7 increase in average per capita income

- **1% increase in Internet penetration**

  ➔ 10.5 increase in average per capita income



Millions of households lacking bank accounts.

(From an article in MIT Technology Review, November/December 2008.)

Benefits of broadband

- Broadband makes the Internet always available at a fast speed:
  - Companies can keep websites up and running 24x7 & can deliver products & services in real time.
  - Individuals enjoy a faster and more pleasant Internet surfing experience and the ability to use bandwidth-intensive applications (e.g., VoIP, IPTV).
  - Broadband also enhances a range of socially desirable and valuable online services in areas such as government, education and health.

Download Performance

Distance from Server to User	Network Latency	Typical Packet Loss	Throughput (quality)	4GB DVD Download Time
Local: <100 mi.	1.6ms	0.6%	44Mbs (HDTV)	12 min.
Regional: 500–1,000 mi.	16ms	0.7%	4Mbs (not quite DVD)	2.2 hrs.
Cross-continent: ~3,000 mi.	48ms	1.0%	1Mbs (not quite TV)	8.2 hrs.
Multi-continent: ~6,000 mi.	96ms	1.4%	0.4Mbs (poor)	20 hrs.

From: **Tom Leighton, Improving Performance on the Internet, Communications of the ACM, Feb 2009**

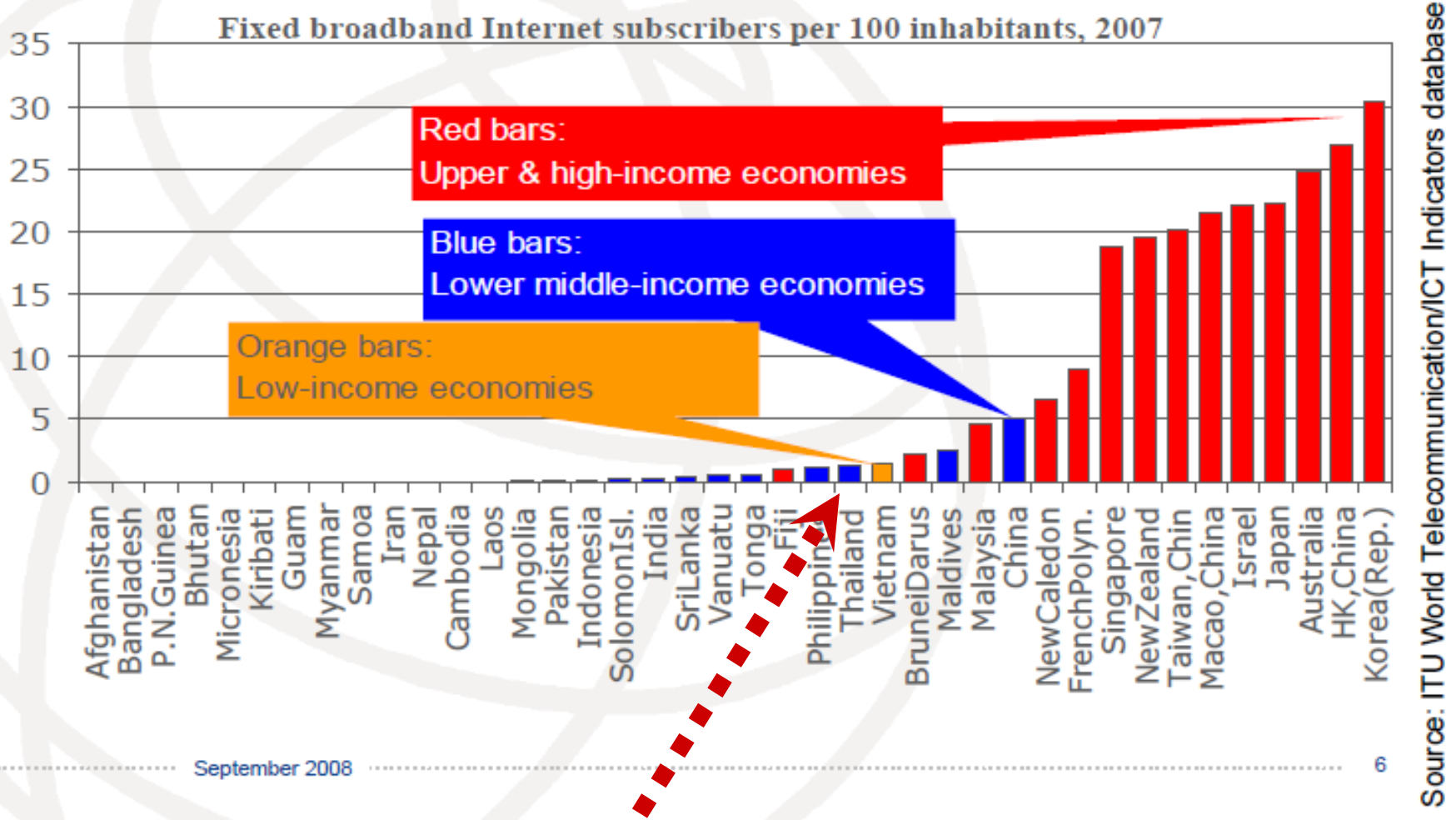

Web 2.0
Aggregators
Folksonomy
Wikis
Blogs
User Centered
Joy of Use
Participation
Six Degrees
Usability
Pagerank
XFN
Widgets
Recommendation
Social Software
FOAF
Browser
Simplicity
Sharing
Collaboration
Perpetual Beta
Videocasting
Podcasting
AJAX
Audio
IM
Video
Design
Convergence
CSS
Pay Per Click
UMTS
Mobility
Atom
XHTML
SVG
Ruby on Rails
VC
Trust
Affiliation
OpenAPIs
RSS
Semantic
Web Standards
SEO
Economy
OpenID
Remixability
REST
Standardization
The Long Tail
DataDriven
Accessibility
XML
Microformats
Syndication
Modularity
SOAP

Asia-Pacific Broadband

- Penetration
- Speed
- Price

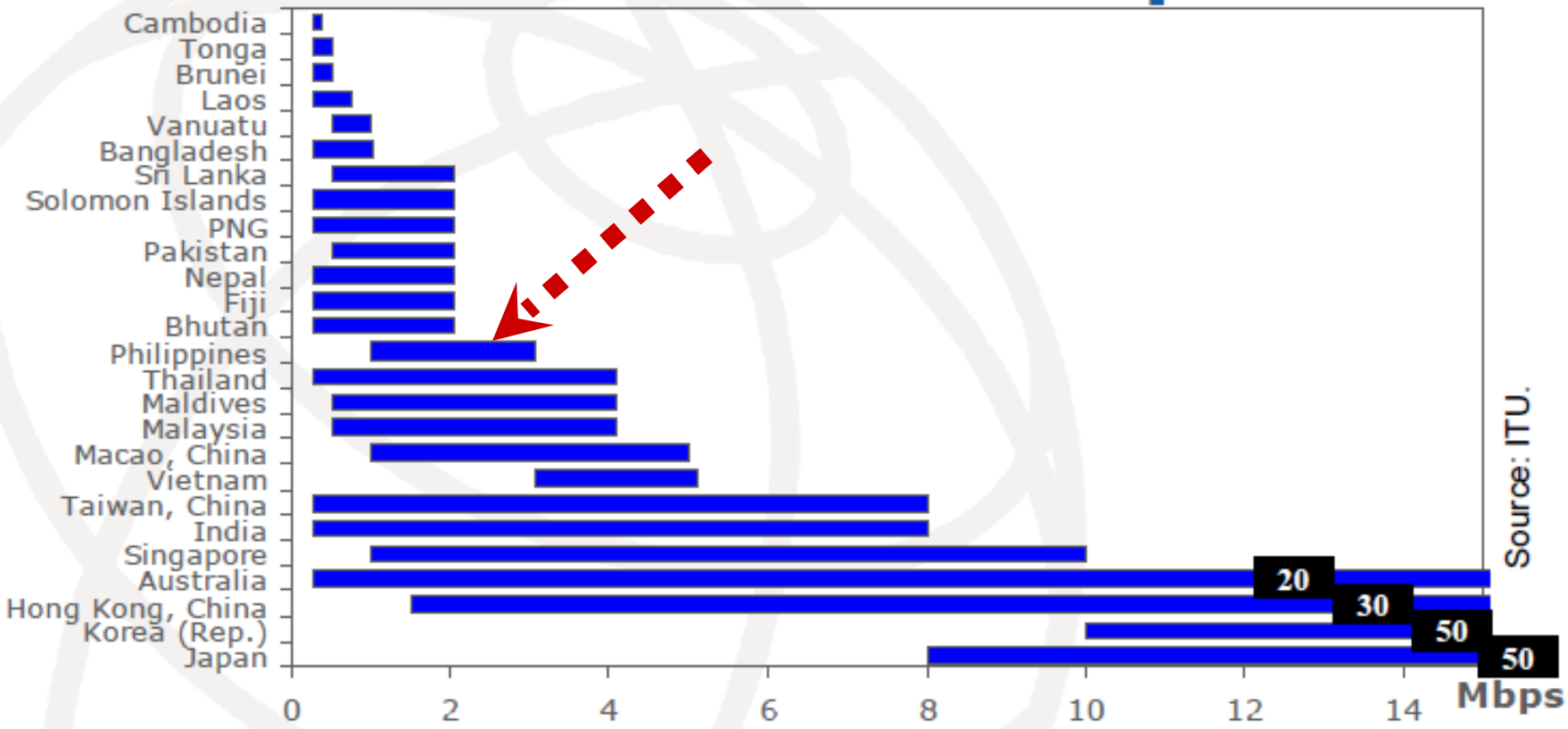
Philippine broadband compared with Asia-Pacific countries?

Broadband divide: penetration



Philippine broadband connections per 100 persons: **1.2 in 2007, 3.4 in 2008**
(EIU IT Competitive Index 2008)

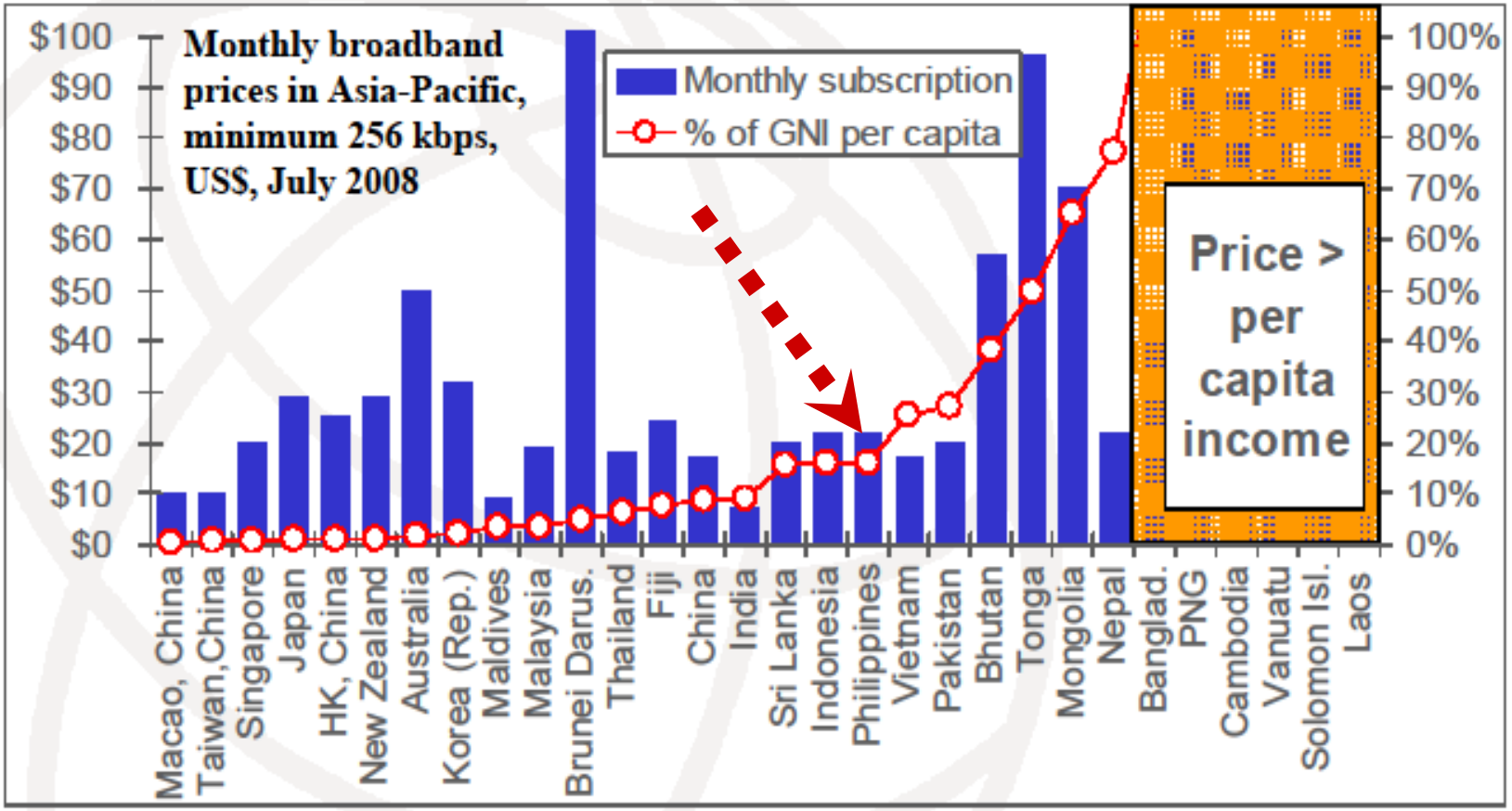
Broadband Divide: Speed



Note: The range of speeds show the advertised lowest and highest speed consumer broadband plan offered using DSL technology. Higher speed, mass market broadband plans using fiber optic connections are available in several high-income economies, with speeds from 100 Mbps to 1 Gbps. For Bangladesh, speeds refer to a cable modem plan.

Philippine broadband: typically 256 kbps, no or small CIR for uplink.

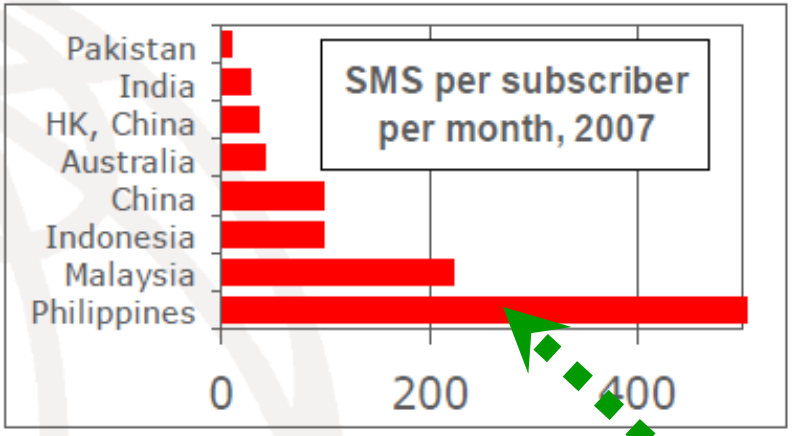
Broadband Divide: Price

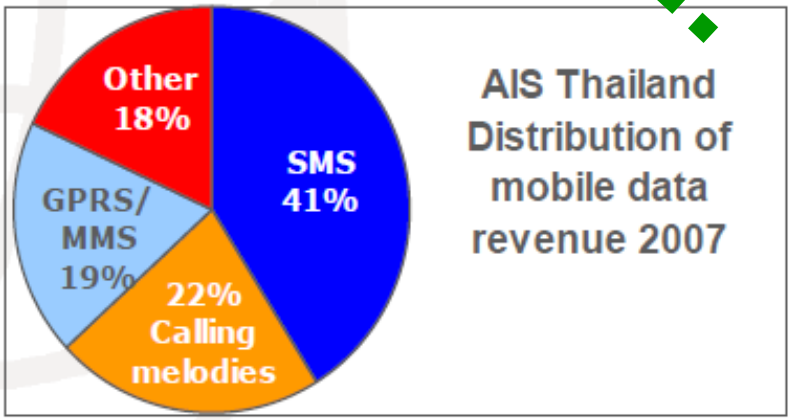


High cost of international fibre & scarcity of international bandwidth / Lack of competition & barriers for new entrants / Economy of scale

Mobile opens the way for new applications

- Asia-Pacific: 30% CAGR over last 5 years; today one out of 3 inhabitants have a mobile phone
- Mid-2008: China and India had 600 and 280 million mobile subscribers
- Spread of mobile data applications
  - SMS
  - Entertainment
  - m-banking
  - m-government
  - m-commerce



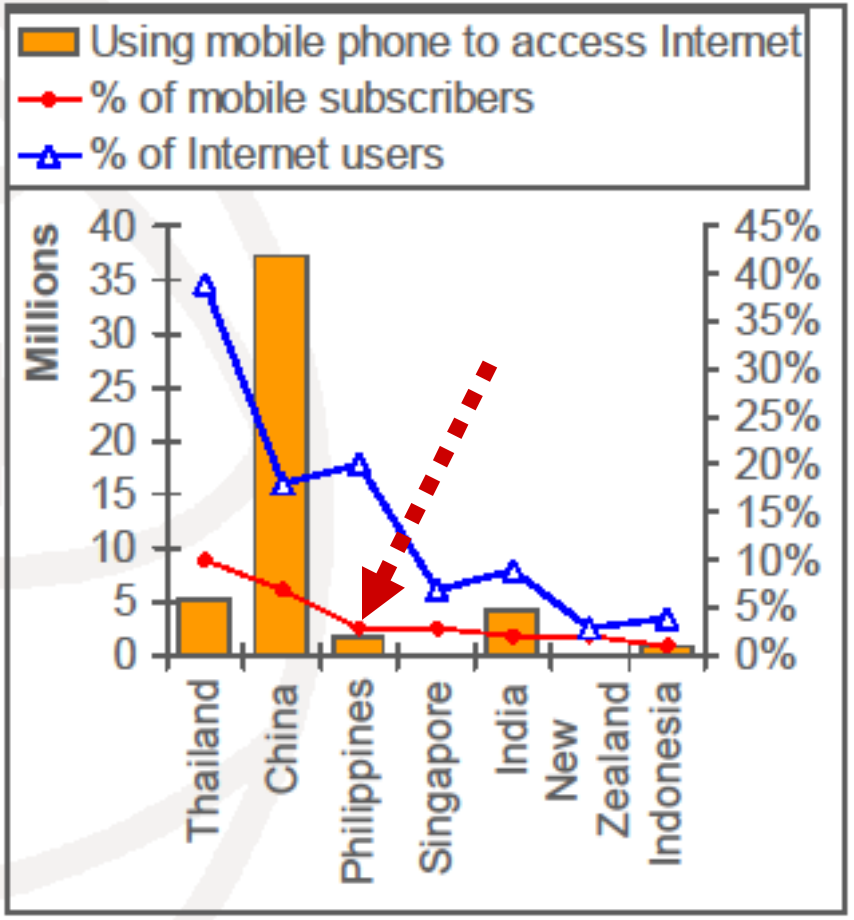


Source: ITU World Telecommunication/ICT Indicators database.

With wireless broadband, smartphones, netbooks and other devices (e.g., cellphone projectors, femtocells), more sophisticated applications are coming!

Mobile browsing

- A growing number of users in low & lower-middle income economies are using mobile phone as browser to access Internet



Source: Adapted from Nielsen Mobile.

The Philippines has a big potential for using mobile phones for Internet access.

POPULATION GROUPING	2007	
WORLD (227 countries)	***23***	69
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EAST ASIA + PACIFIC	***14***	65
PHILIPPINES	***6***	60+

The Philippines belongs to the "LOWER MIDDLE INCOME" GROUP.

Its telephony penetration (60+) is higher than that of the group (53).

However, its internet penetration (6, lower than data from other sources) ***is much lower than that of the group*** (16).

Internet users per 100 pax

Fixed-line +Mobile phones per 100 pax

Two different broadband trends

- In high-income economies, ubiquitous access is progressing through a competitive race to provide ever faster fixed broadband speeds; deployment of mobile broadband at ever lower price
- Four Asian tigers and Japan are world leaders in broadband penetration, fibre deployment, IP-based voice and video applications and 3G mobile use
- Fixed and mobile technologies complement each other so that many users enjoy uninterrupted high-speed connectivity

- In low and lower-middle-income economies, mobile phones have become a substitute for fixed lines and fixed broadband access
- Many data needs are being fulfilled by the mobile phone, often at non-broadband speeds and delivered to small screens
- Visits to Internet cafes are made (where available) when higher speed, PC-based access is needed
- While ICT access is growing, it is often low-speed, not always convenient and not ubiquitous

In developing countries most users may have to live with low Internet access speeds; for special needs, they can go to shared facilities, e.g., Internet cafes.

Philippine Telcos and Value-Added Service Providers

- Telecommunications Companies
  - Coverage
  - Broadband
- Value Added Service Providers
  - Telco-owned ISPs
  - Non-Telco owned ISPs
  - ***Content/Application Service Providers***

Suggested improvements on the PII

- *On the "last mile"*
  - **Higher bandwidth**
    - **Wireless broadband**
    - **Satellite downlink for rural areas**
  - **Availability of higher speed uplink**
- *On the "middle mile"*
  - **Set up telco-neutral IXPs (Manila, Cebu)**
  - **Set up nationwide CDNs**

What is IXP?

An **Internet exchange point** (**IX** or **IXP**) is a physical infrastructure that allows different ISPs to exchange Internet traffic between their networks (autonomous systems) by means of mutual peering agreements, which allow traffic to be exchanged without cost.

- IXPs reduce the portion of an ISP's traffic which must be delivered via their upstream transit providers, thereby *reducing the Average Per-Bit Delivery Cost of their service*.
- Furthermore, the increased number of paths learned through the IXP *improves routing efficiency and fault-tolerance.*

What is CDN?

A **content delivery network** or **content distribution network** (*CDN*) is a system of computers networked together across the Internet that cooperate transparently to deliver content most often for the purpose of improving performance, scalability, and cost efficiency, to end users.

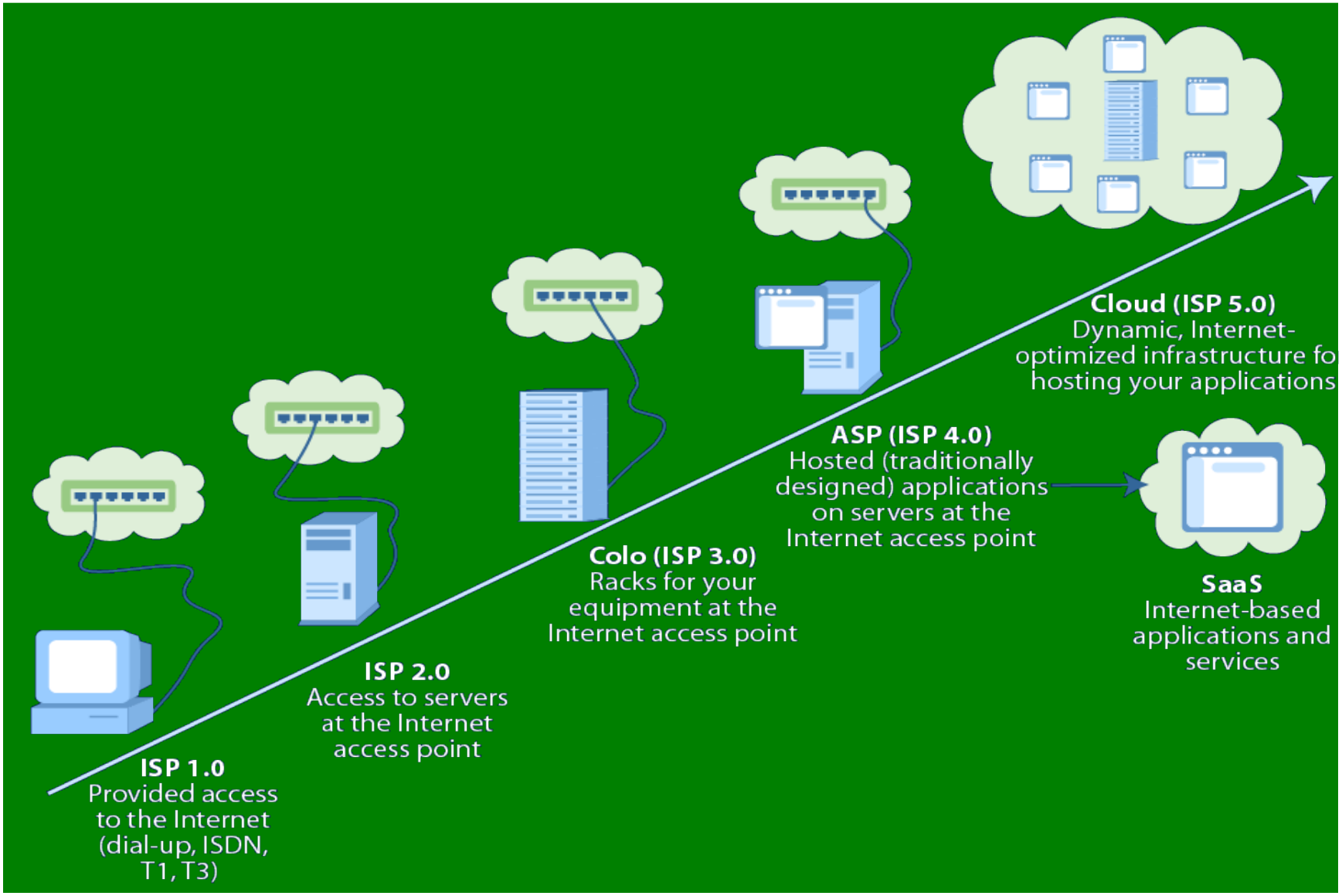
What is Cloud Computing?

- **Cloud computing** is a style of computing in which typically real-time scalable resources are provided “as a service” over the Internet to users who need not have knowledge of, expertise in, or control over the technology infrastructure ("in the cloud") that supports them.
  - The concept incorporates SaaS, Web 2.0 and other recent, well-known technology trends, in which the common theme is reliance on the Internet for satisfying the computing needs of the users.
  - The *cloud* is a metaphor for the Internet, based on how it is depicted in computer network diagrams, and is an abstraction for the complex infrastructure it conceals.

Cloud computing characteristics

- Massive, abstracted infrastructure
  - Components decided for you
- Dynamic allocation, scaling, movement of applications
- Pay per use
- No long-term commitments
- OS, application architecture independent
- No hardware or software to install

Cloud computing: latest evolution of hosting



How?

- **Generate demand for broadband**
  - Encourage/enable Philippine-based companies to set up ICT and/or ICT-enabled services -- *without having to invest too much in hardware, software and networking resources*
  - *Support collaboration* (both real and virtual) among SMEs, communities, and other groups
- **Engineer cooperation among telcos and content companies to establish telco-neutral IXPs**
- **Promote the use of Philippine-based Internet Data Centers (telco-owned and non-telco owned) for CDN hosting**

Thank You!