



INFORMATION ECONOMY REPORT 2013

The Cloud Economy and Developing Countries

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23 April 2014

Presentation at P166 Short Course

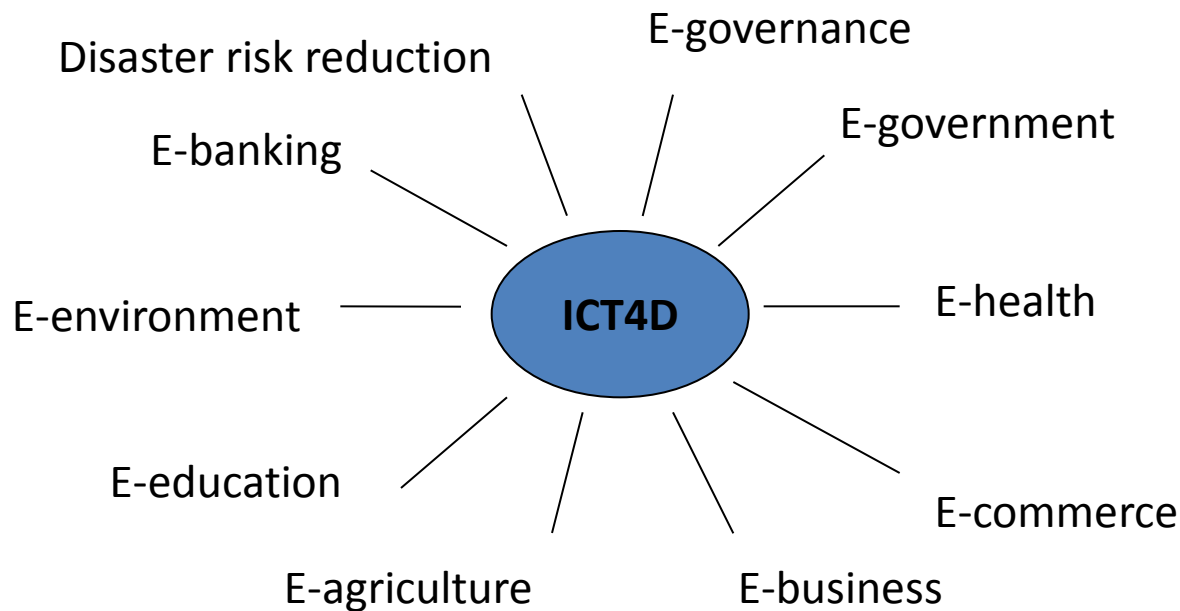
Outline

-  **Why information and communications technologies (ICTs) matter**
-  **UNCTAD's role**
-  **The Cloud Economy and Developing Countries**

-  **Cécile Barayre:**
 - Regulatory implications of cloud computing
 - UNCTAD's work on E-commerce and cyberlaw harmonization

Why ICTs matter

General-purpose technology: applied throughout society



ICT Infrastructure

ICT skills

Local content

Legal framework

UNCTAD's Role (1)

Mandate

- Doha Mandate §56q
- Accra Accord §158-161

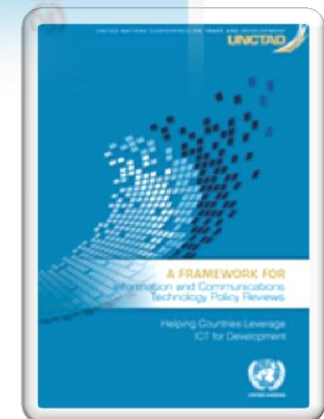
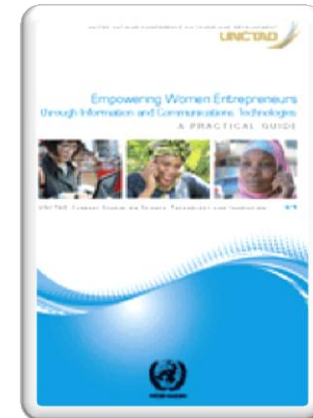
Research and analysis

- Information Economy Report, statistics
- ICTs and Women's Entrepreneurship

Technical assistance and capacity-building

- Measuring the Information Economy
- E-commerce and law reform
- ICT Policy Reviews

Consensus-building



UNCTAD's Role (2)

Collaboration within UN system

UN Group on the Information Society (UNGIS)

- Chairs and vice chairs: ITU, UNCTAD, UNESCO, UNDP and UNDESA
- 30 members



Co-organizer of the annual WSIS Forum/WSIS+10 HL Event

- Lead facilitator of Action Line C7 on E-business
- High Level Event: **10-13 June 2014**



World Summit Geneva 2003
Tunis 2005
on the Information Society
Turning targets into action

Secretariat of the CSTD

- Follow-up to the WSIS – next session **12-16 May 2014**

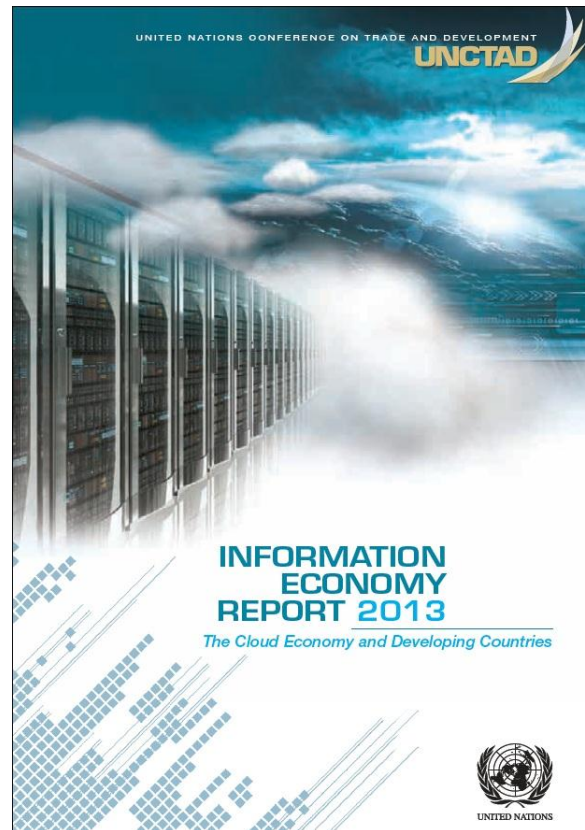
Partnership on Measuring ICT for Development

- Member of its Steering Committee
- 13 members



IER2013

The Cloud Economy and Developing Countries



What is Cloud Computing?

- ☁ A way of delivering applications, services or content remotely, rather than requiring users to hold them on their own servers, computers or other devices.
 - *Cloud computing is a model for enabling **ubiquitous, convenient, on-demand** network access to a **shared pool of configurable computing resources** (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (NIST, 2011)*

- ☁ Webmail, online social networks and file-sharing among the most popular applications on the Internet, also in the developing world.

- ☁ Metaphor of the "cloud" is misleading – cloud computing enabled by the combination of the physical hardware, networks, storage, services and interfaces needed to deliver computing as a service.



What enables the Cloud?

Processing power

- Intel's current 22 nanometre CPU is 4,000 times faster, uses 0.02 per cent of the energy and costs 1/50,000 of its first CPU released in 1971

Digital storage

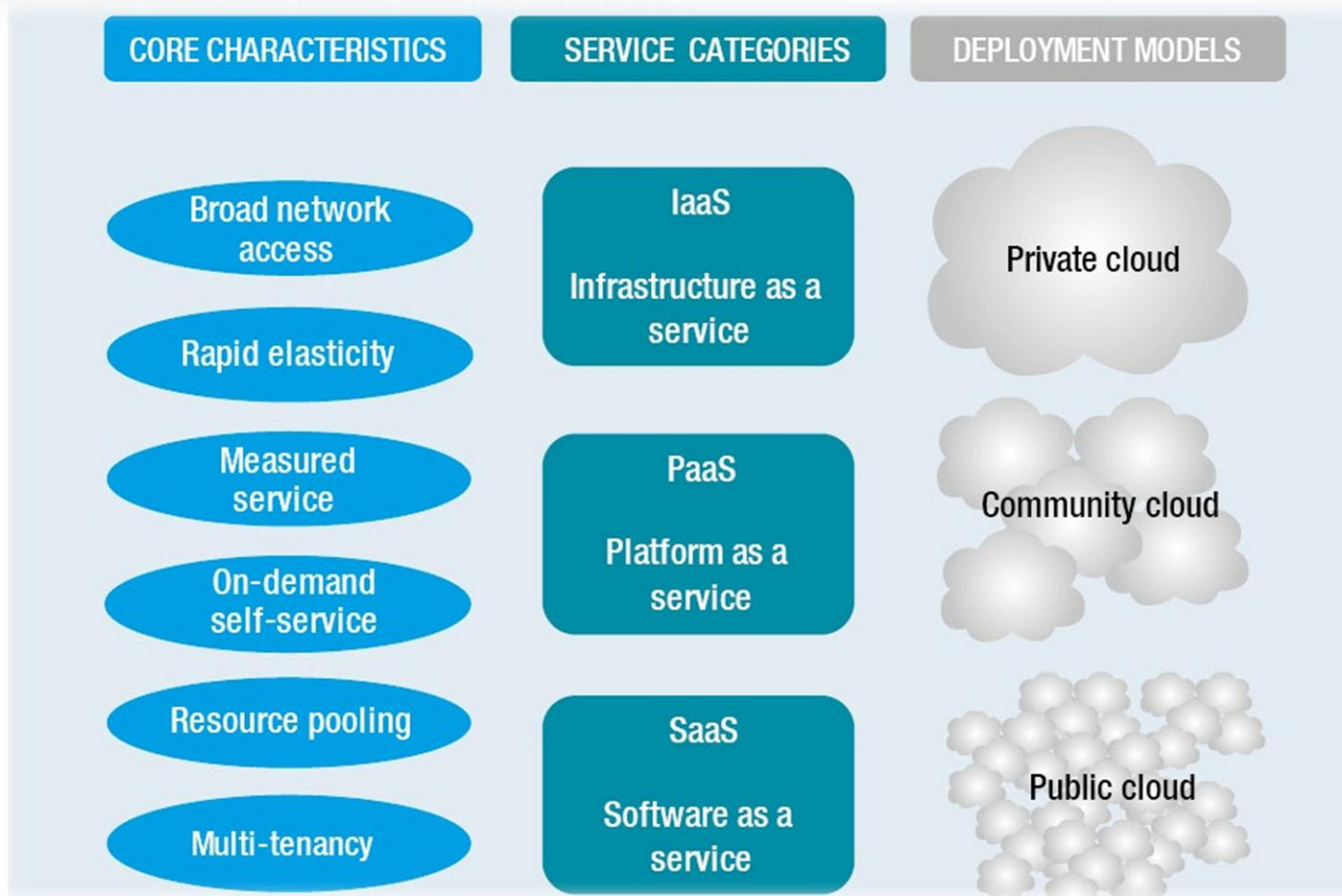
- The first IBM PC (1981) cost \$3,000; accepted diskettes of 160kb
- By 2010, a hard disk for \$600 could store all music ever recorded

Transmission speed

- Dial-up connection in 1993: 56kbps
- As of 2013, some consumer broadband packages 2Gbps – some 36,000 times faster



Cloud computing characteristics and models



Source: UNCTAD, adapted from NIST 2011.



Cloud revenue estimates and forecasts vary

2010 and 2015, \$ billions

	2010				2015			
Forecast by:	SaaS	Paas	IaaS	Total	SaaS	Paas	IaaS	Total
Gartner	10.0 (70.9%)	1.3 (9.2%)	2.8 (19.9%)	14.1 (100.0%)	21.3 (49.2%)	2.4 (5.5%)	19.6 (45.3%)	43.3 (100.0%)
Forrester	13.4 (91.1%)	0.3 (2.2%)	1.0 (6.7%)	14.7 (100.0%)	78.4 (83.5%)	9.8 (10.4%)	5.8 (6.1%)	94.1 (100.0%)

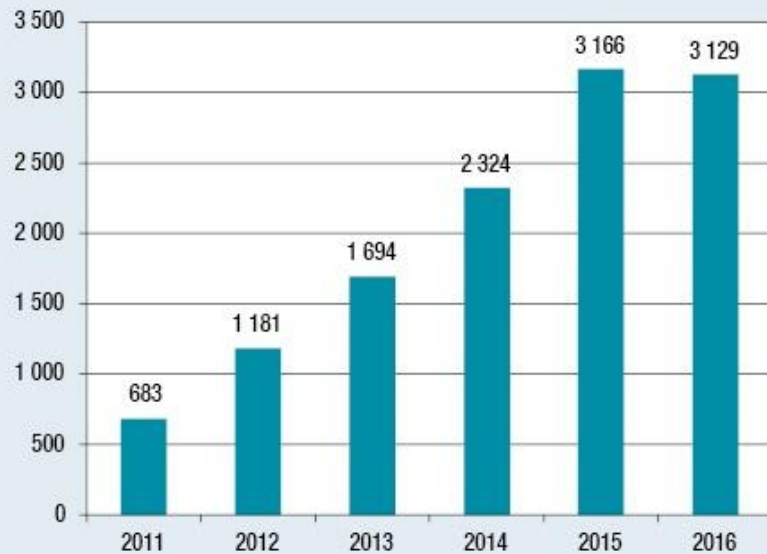
Source: Berry and Reisman, 2012: 6.



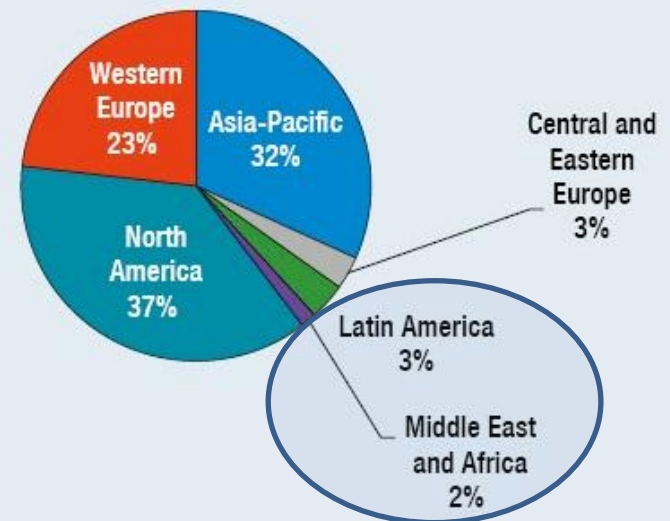
Cloud-related traffic on the Internet

Mainly in developed countries but growing fast

Cloud traffic (exabytes)



Distribution of cloud traffic, 2012



Source: Cisco Analysis.



Top Global Cloud Companies

by estimated number of servers 2012

Company	Home country	Estimated number of servers
Google	United States	900,000
Microsoft	United States	300,000
Amazon Web Services	United States	250,000
Facebook	United States	180,000
Akamai	United States	127,000
OVH	France	120,000
Softlayer	United States	100,000
Rackspace (2011)	United States	79,805
Intel	United States	75,000
1&1	United States	70,000

Source: UNCTAD, based on information from company reports and other sources.



Pros and cons with the Cloud

Potential advantages	Potential disadvantages
Reduced costs for rented IT hardware and software than for in-house equipment.	Increased costs of communications (to telecom operators/ISPs)
Reduced cost of in-house IT management	Increased costs for migration and integration
Enhanced elasticity of storage/processing capacity	Reduced control over data and applications
Greater flexibility and mobility of access to data and services	Data security and privacy concerns
Immediate and cost-free upgrading of software	Unreliable services, e.g. due to inadequate ICT or power infrastructure
Enhanced reliability/security of data and services	Risk of vendor lock-in (limited interoperability and data portability) with providers

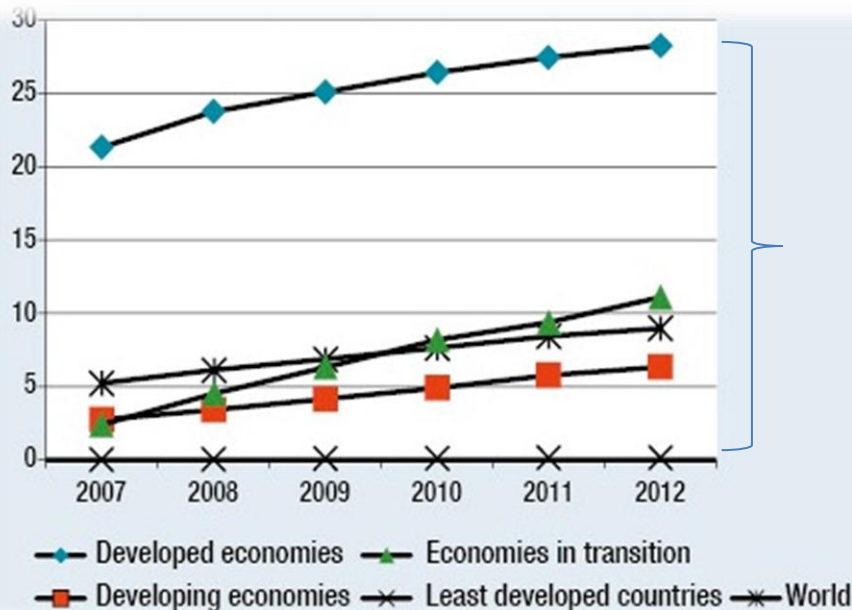
Source: UNCTAD.



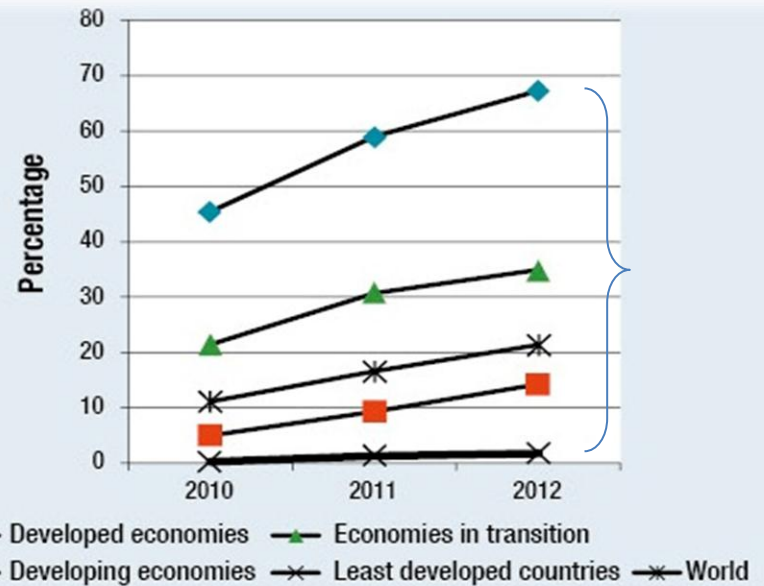
The Broadband Challenge

Gap to LDCs keep widening

Fixed broadband subscriptions per 100 people, 2007-2012



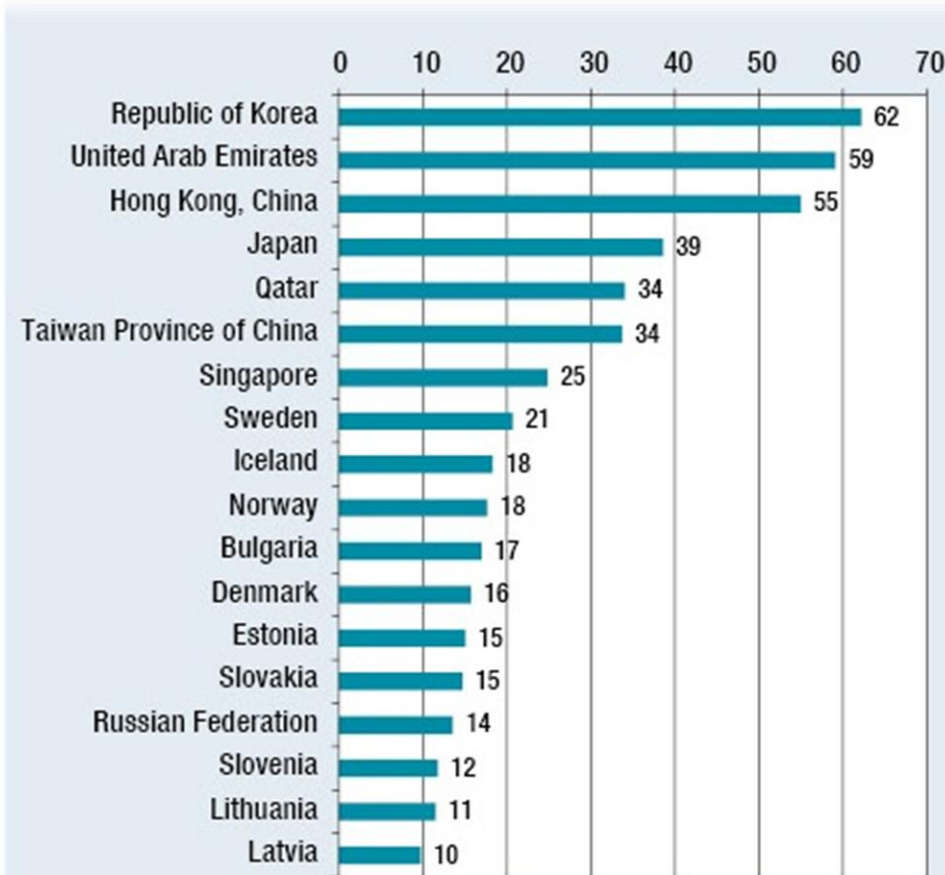
Active mobile broadband subscriptions per 100 people, 2010-2012



Source: ITU.



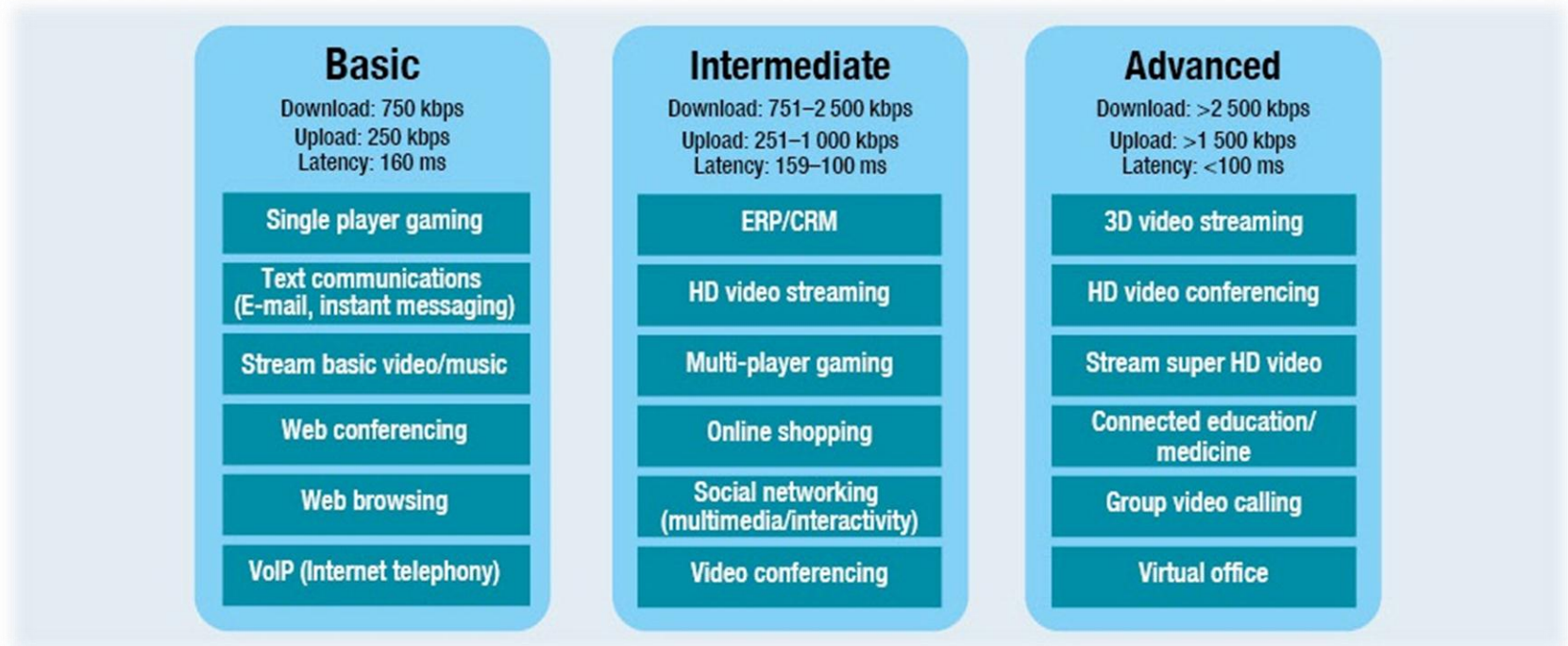
Economies with more than 10% household penetration with Fibre to the Home/Building plus local area network 2012



* Data for the United Arab Emirates, Japan, Bulgaria, Estonia and Latvia refer to 2011.

Source: ICTData.org.

“Quality of Service” requirements vary



Latency and upload speeds main bottlenecks for developing countries.



Broadband Quality of Service – Africa

Meet minimum requirements for advanced cloud services	Meet minimum requirements for basic cloud services	Do not yet meet requirements for basic cloud services
	Egypt Ghana Kenya Morocco South Africa Tunisia	Algeria Angola Côte d'Ivoire Mauritius Mozambique Namibia Nigeria Senegal Sudan Uganda United Republic of Tanzania Zambia Zimbabwe

Source: UNCTAD, based on Cisco Analysis 2012.

Broadband Quality of Service - LAC

Meet minimum requirements for advanced cloud services	Meet minimum requirements for basic cloud services	Do not yet meet requirements for basic cloud services
	Argentina, Aruba Barbados, Bermuda Brazil, Chile Colombia, Costa Rica Dominican Republic Ecuador, El Salvador Guatemala, Honduras Jamaica, Mexico Nicaragua, Panama Puerto Rico, Trinidad and Tobago, Uruguay Venezuela (Bolivarian Rep. of)	Antigua and Barbuda Belize Bolivia (Plurinational State of) Haiti Paraguay Peru Suriname

Source: UNCTAD, based on Cisco Analysis.



Broadband Quality of Service – Asia Pacific

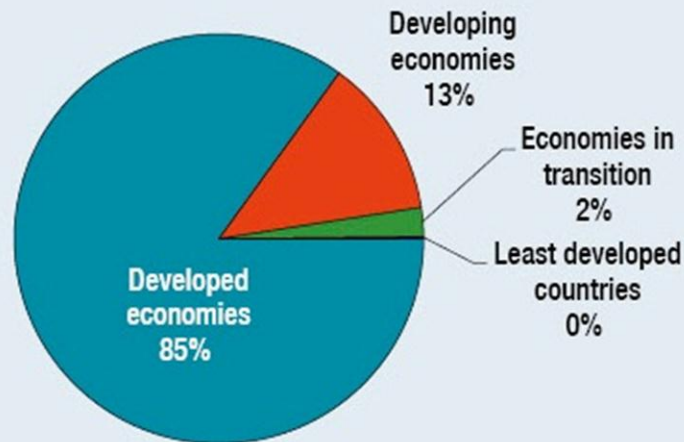
Meet minimum requirements for advanced cloud services	Meet minimum requirements for basic cloud services	Do not yet meet requirements for basic cloud services
Armenia China Hong Kong China Taiwan Province of China Georgia Japan Republic of Korea Malaysia Mongolia Russian Federation Singapore Viet Nam	Australia, Azerbaijan Brunei Darussalam Cambodia, India Indonesia Iran (Islamic Republic of) Kazakhstan, Nepal New Zealand, Pakistan Philippines, Qatar Solomon Islands Sri Lanka Thailand Turkey	Afghanistan Bangladesh Maldives Myanmar Samoa Tajikistan Turkmenistan Uzbekistan

Source: UNCTAD, based on Cisco Analysis 2012.

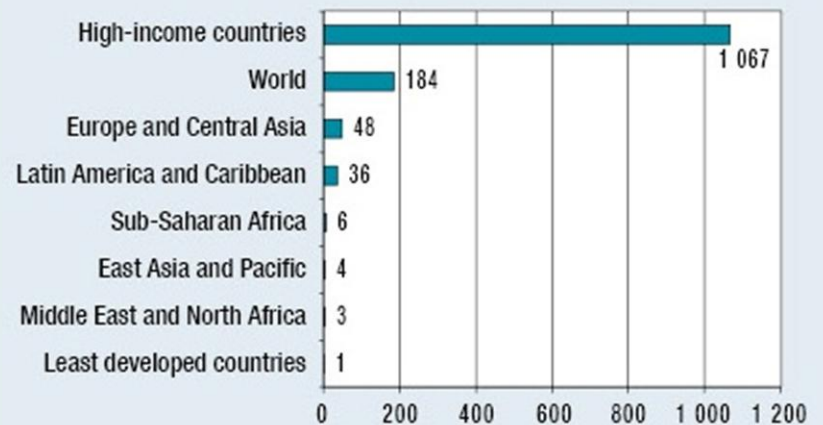


The Data Centre and Server Divides

Co-location data centres, 2013



Secure Internet servers per 1 million people, 2012



Source: DataCentreMap and World Bank.



Regulatory issues

- ☁ Cloud data can become subject to multiple jurisdictions
- ☁ The transfer of data out of the user's jurisdiction may raise issues of control, effective oversight and audit.
- ☁ For some regulated sectors, such as financial services, cloud-related transfers and storage outside the jurisdiction may breach national rules.
- ☁ Key legal areas to address:
 - Data protection
 - Privacy
 - Cybercrime



Policy Recommendations

- ☁ Welcome the cloud economy but tread carefully
- ☁ Assess “cloud readiness” and define national cloud strategy with relevant stakeholders
- ☁ Consider all cloud configurations: public/private/hybrid clouds implemented nationally, regionally or globally
- ☁ Enhance access to reliable, affordable broadband
- ☁ Address laws and regulations concerning privacy, data protection and cybercrime
- ☁ Recognize supply side opportunities of the cloud economy
- ☁ Consider Government's own use of the cloud
- ☁ Seek support from Development Partners



Supply-side cloud opportunities in developing countries

Data centre services

- Local and foreign providers
- Government-owned centres

Provision of cloud services for local customers

- Infrastructure as a Service (IaaS) – typically first step in low-income countries
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

Cloud aggregation, system integration, brokerage and related services

- Leverage experience with national business, legal and communications environment.



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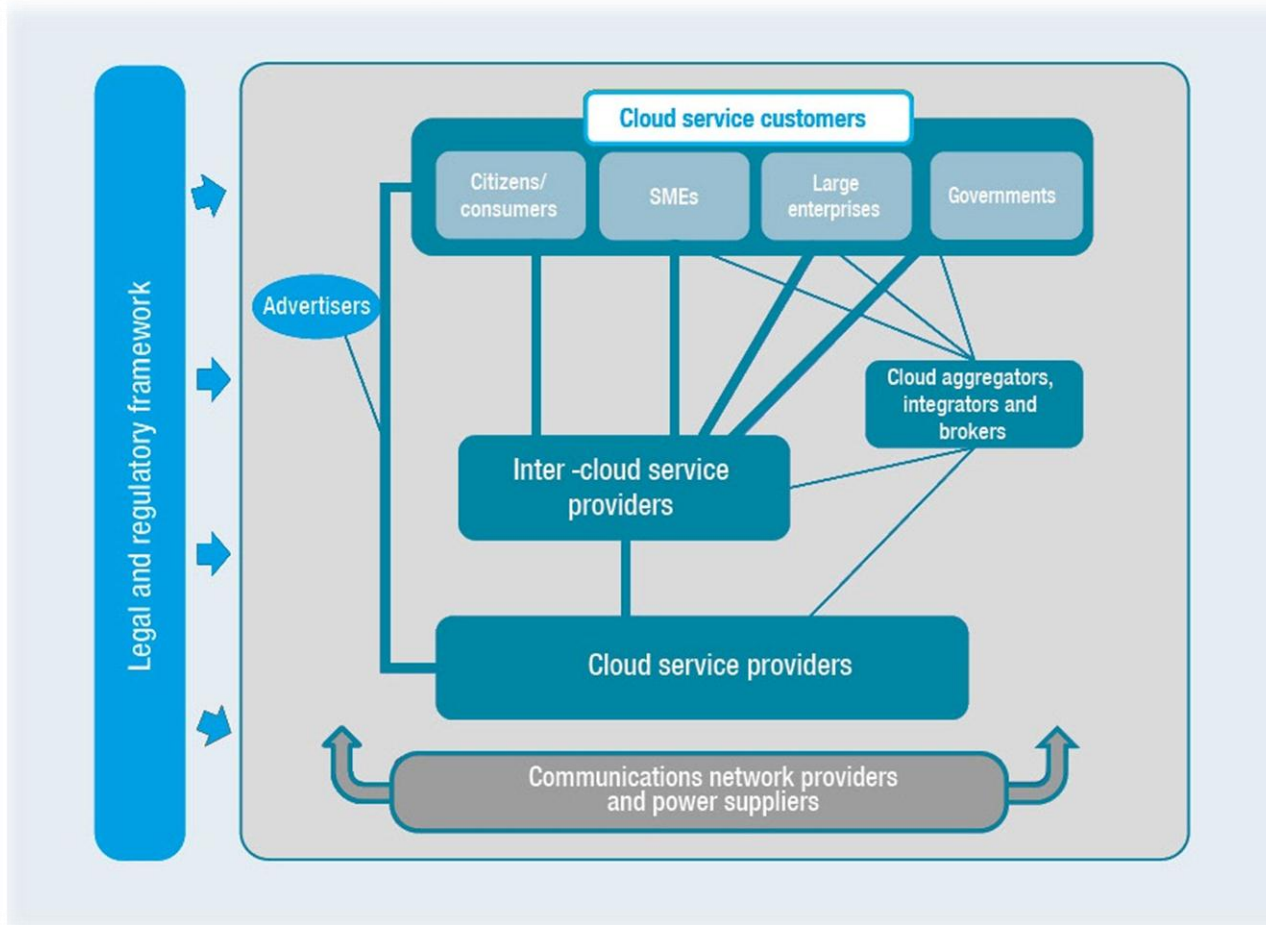
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Extra slides



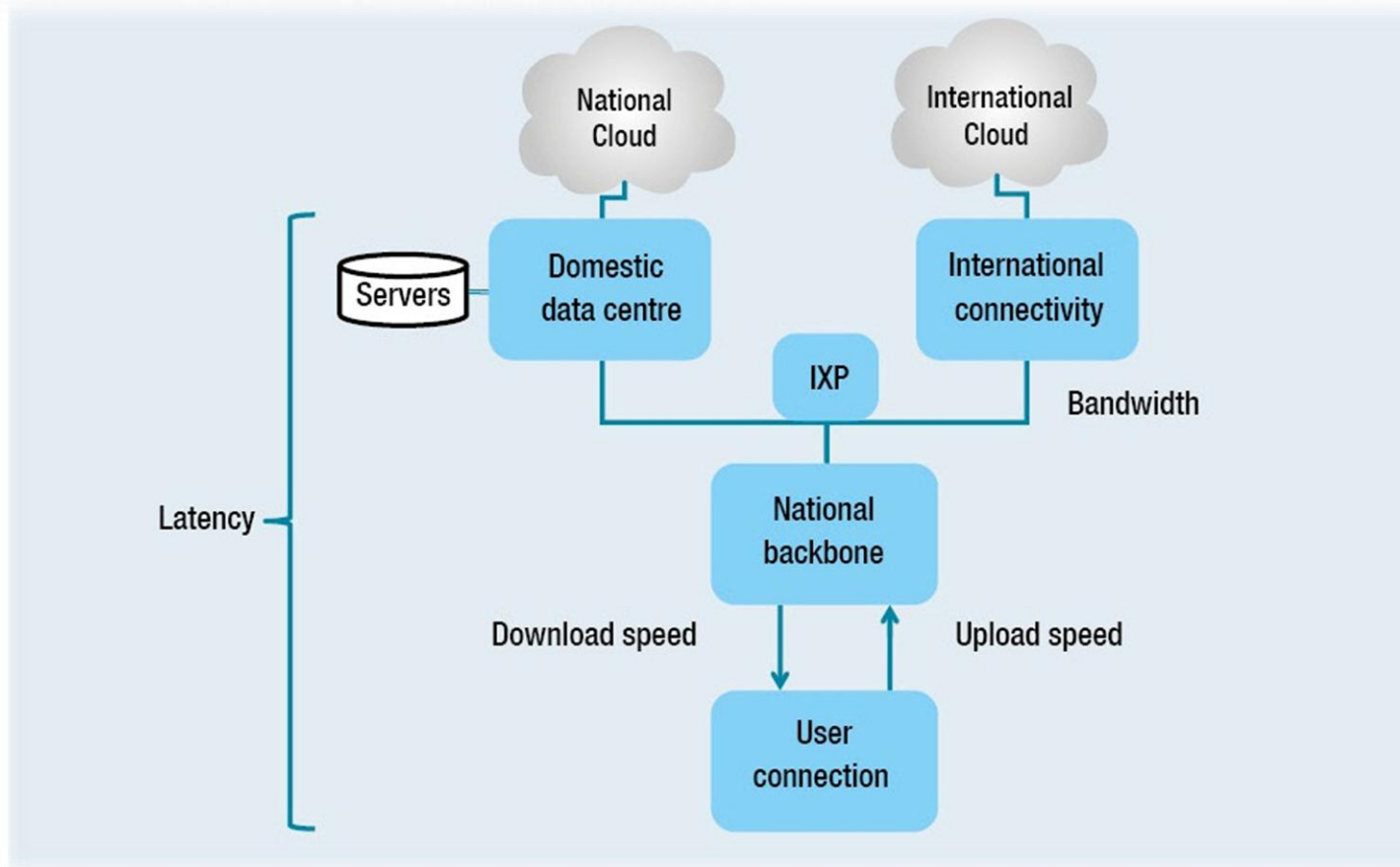
The Cloud Economy

Key stakeholders and market relationships



Source: UNCTAD.

Getting to the cloud

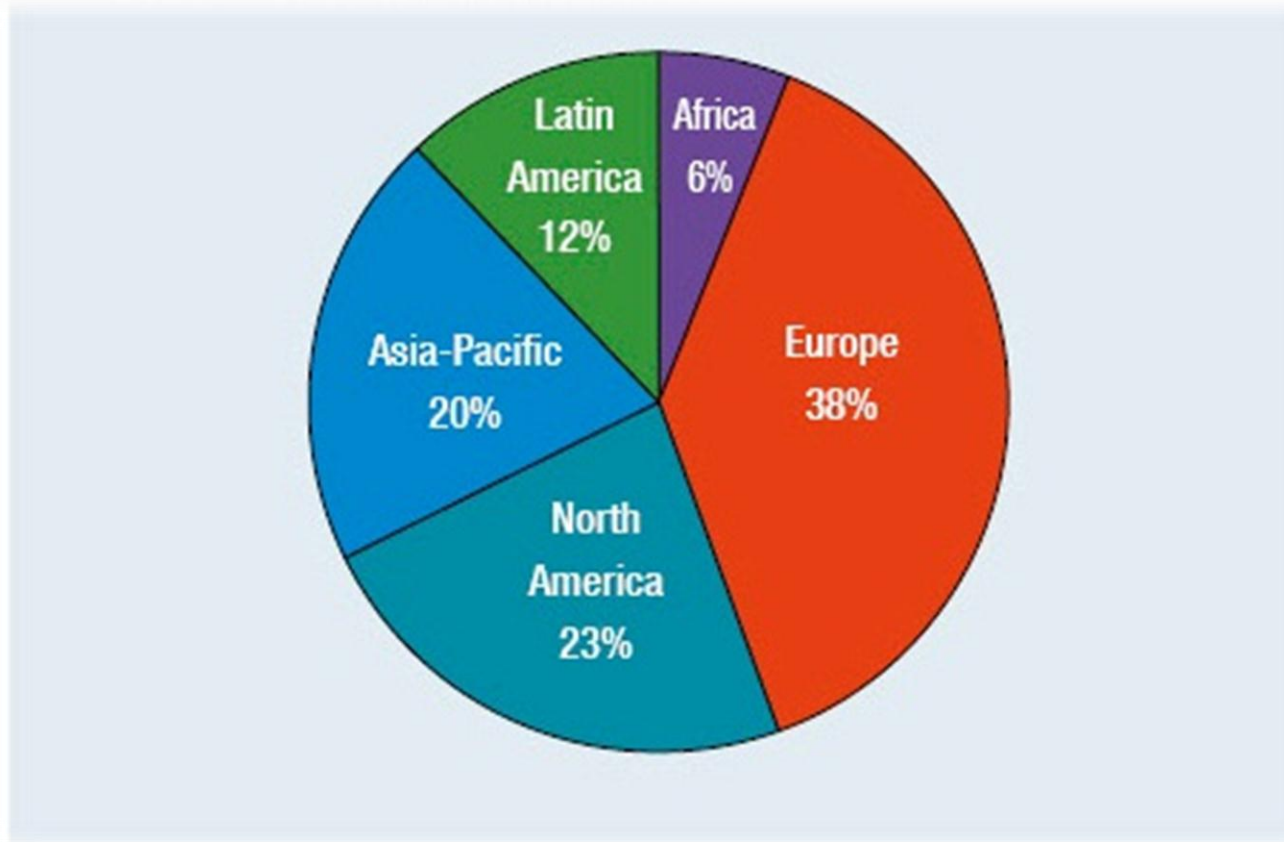


Source: UNCTAD.



The Internet Exchange Point (IXP) Divide

Distribution (%) of IXPs by region, June 2013



Source: Packet Clearing House.

