Broadband Access - Policy and Regulatory Trends

ITU ASP COE Training

On

Broadband QoS-End User Perspective

27-30 October 2015

TOT Academy, Thailand

IMPROVING QUALITY OF LIFE..


Emergency


Education


Health


Agriculture

Governance


Investment


Applications


Policy & Regulation


Capacity Building


Transport


Sensor Networks


Universal Broadband


Green ICT & E-Waste


Measurements


Electricity

SMART SOCIETY


Infrastructure Security


Privacy & Security


Water


Digital Inclusion

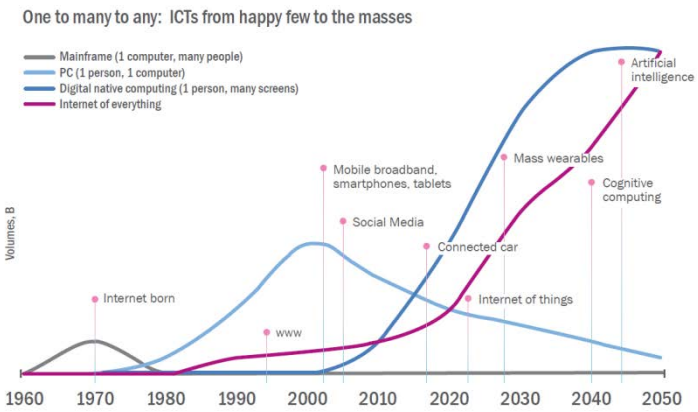

Spectrum Management


Standards, Conformity & Interoperability


Teleworking

Appropriate and timely ICT policy & regulatory framework is very important for to harness technology ……..

History of the future



Source: ITU

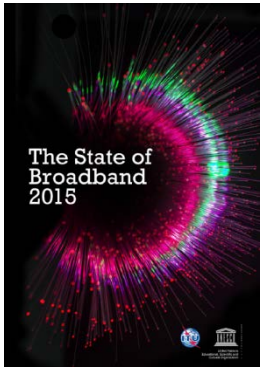


Table 1: Estimates of the Global Market, 2012-2015 and 2020

	2012	2013	2014	2015	2020
Mobile cellular subscriptions	6.23 bn (ITU)	6.67 bn (ITU)	6.95 bn (ITU) 7.1 bn (E)	7.09 bn (ITU)	9.2 bn (E)
Unique mobile phone users	--/--	5.2 bn (MM)	3.65 bn (WeAreSocial) 5 bn (Cisco)	3.7 bn mid-2015 (GSMA) 4.9 bn (E) 5.2 bn (World Bank)	--/--
LTE subscriptions	--/--	200m (E)	500m (E)	Q1 - 600m (E) Q4 - 1.37 bn (ABI Research) [8]	3.7 bn (E); 2.5 bn (GSMA); 3.5 bn (ABI)
Mobile broadband subscriptions	1.55 bn (ITU)	1.95 bn (ITU) 2.1 bn (E)	2.69 bn (ITU)	3.46 bn (ITU)	7.7 bn; 85% of all subscriptions (E)
Fixed broadband	635m (ITU)	710m (ITU)	748m (ITU)	794m (ITU)	--/--
Internet users	2.49 bn (ITU)	2.71 bn (ITU)	2.94bn (ITU)	3.17bn (ITU)	4 bn by 2020
Facebook users	1.06 bn MAU 618 DAU (Facebook, Dec 2012)	1.23 bn MAU 757 DAU (Facebook, Dec 2013)	1.393 bn MAU 890m DAU (Dec 2014)	1.44 bn MAU* 936 DAU* (Facebook)	--/--
Smartphone subscriptions	1.3 bn (MM)	1.7 bn (MM)	2.1 bn (MM)	40% total mobile subscriptions (E);	Equivalent to 70% world's population (E)
Smartphone stock	--/--	--/--	1.8 bn (Del) 2.7 bn (E); Q1/14 - 64% mobile phones (E)	2.2 bn (Del); Q1/15 - 75% of mobile phones (E)	6.1 bn subscriptions (E); 70% world's population (E)
Smartphone handset shipments or sales	712.6m (IDC)	30% of all mobiles (MM)	--/--	1 bn (IDC);	--/--

Source: Various. MM = Mary Meeker. E = Ericsson Mobility June 2015 report. Prior forecasts from November 2015 report. Del= Deloitte TMT Predictions 2015 report.

*Note: For Facebook figures, MAU = monthly average users; DAU = daily average users. *Q1 2015 figures.*

Mobile Broadband Network Deployment Trends

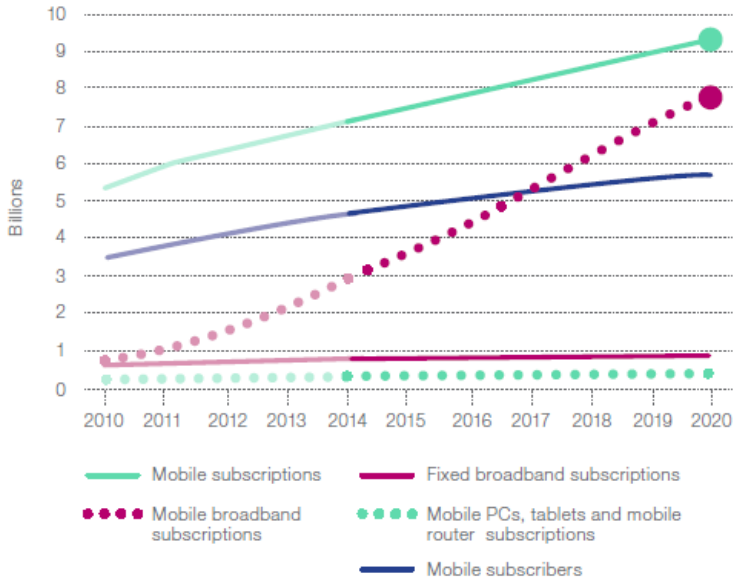
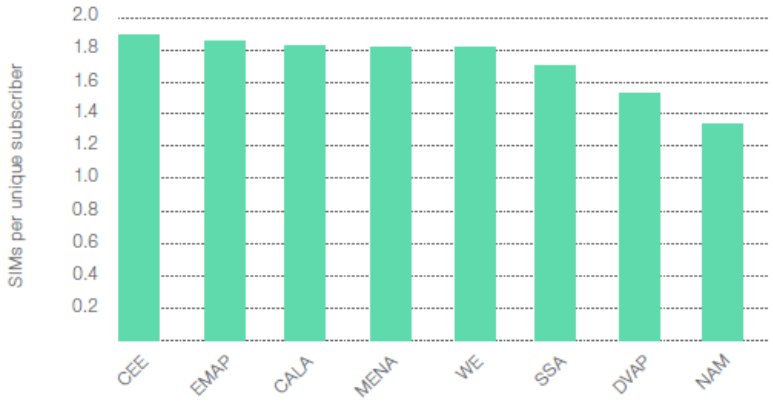


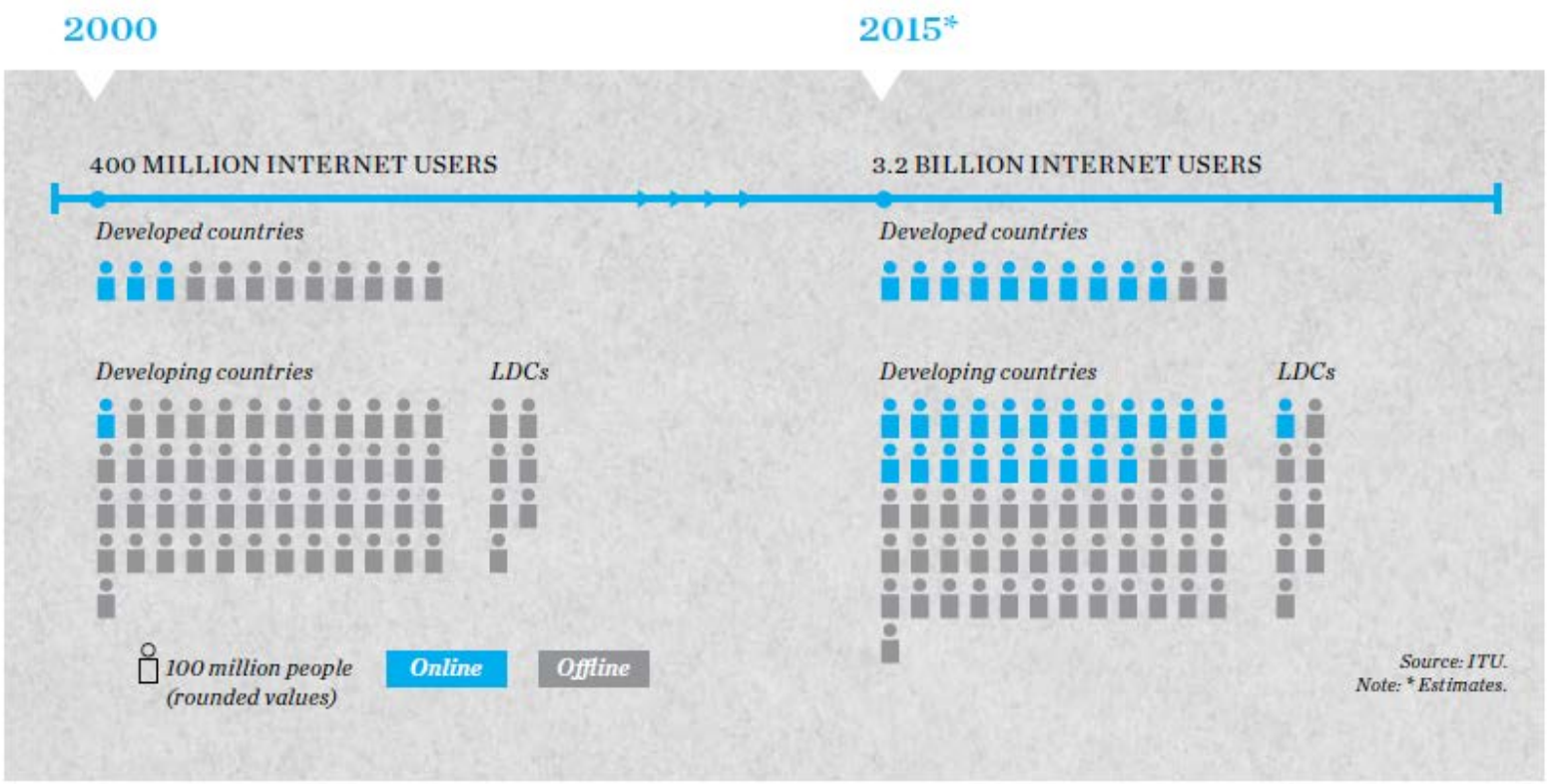
Figure 4: Comparing Global Subscriptions with Subscribers

Global totals of subscriptions and subscribers for mobile and fixed broadband (top); Total mobile SIMs per unique subscriber, end 2014 (bottom).

Sources: Ericsson Mobility report, June 2015 (top); the Internet Society's "Global Internet Report 2015", based on GSMA (bottom).



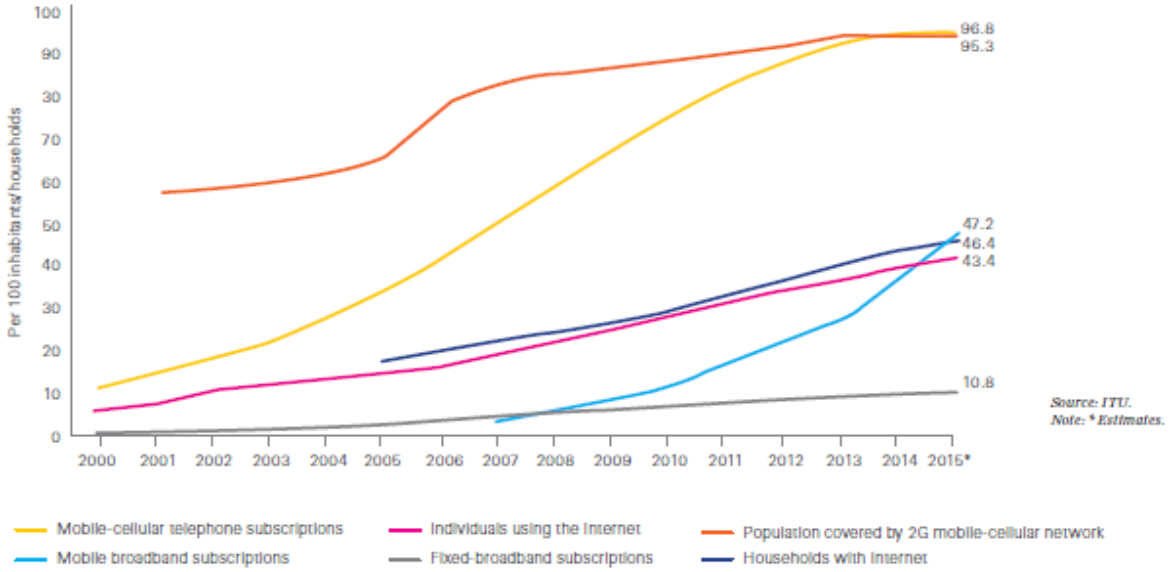
CEE: Central & Eastern Europe
EMAP: Emerging Asia-Pacific
CALA: Central & Latin America
MENA: Middle East & North Africa
WE: Western Europe
SSA: Sub-Saharan Africa
DVAP: Developed Asia-Pacific
NAM: North America



- Globally 3.2 billion people are using the Internet by end 2015, of which 2 billion are from developing countries
- For every Internet user in the developed world there are 2 in the developing world
- However, 4 billion people from developing countries remain offline, representing 2/3 of the population residing in developing countries
- Of the 940 million people living in the least developed countries (LDCs), only 89 million use the Internet, corresponding to a 9.5% penetration rate

Source: ITU

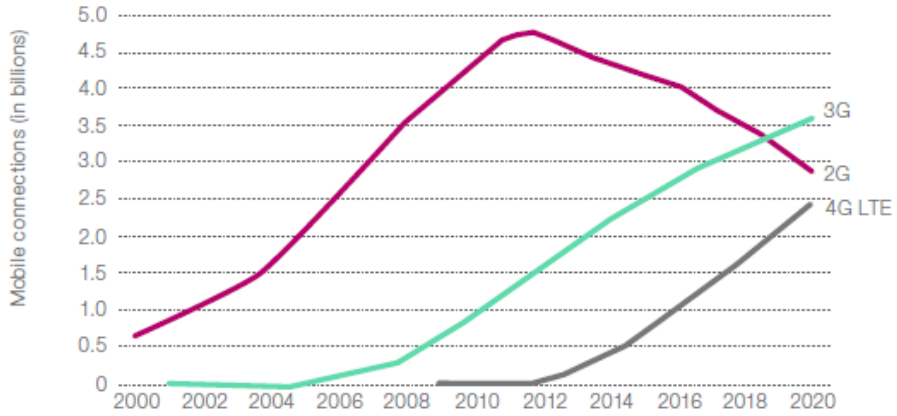
15 years of ICT growth: what has been achieved?



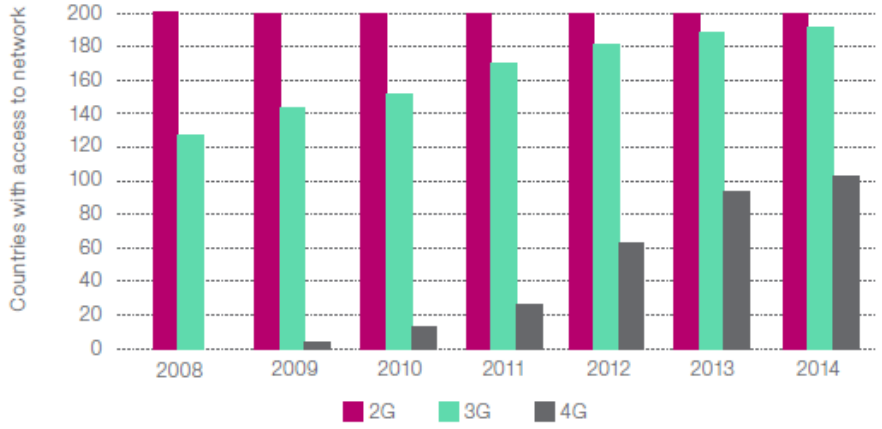
- By end 2015, there are more than 7 billion mobile cellular subscriptions, corresponding to a penetration rate of 97%, up from 738 million in 2000
- Between 2000-2015, global Internet penetration grew 7 fold from 6.5% to 43%
- Mobile broadband is the most dynamic market segment; globally, mobile-broadband penetration reaches 47% in 2015, a value that increased 12 times since 2007
- The proportion of households with Internet access at home increased from 18% in 2005 to 46% in 2015
- Fixed-broadband uptake is growing at a slower pace, with a 7% annual increase over the past three years and reaching 11% penetration by end 2015
- The proportion of the population covered by a 2G mobile-cellular network grew from 58% in 2001 to 95% in 2015

Source: ITU

Mobile Broadband Network Deployment Trends



By the end of 2014, Telegeography reports that 2G networks had been deployed in 200 countries, active 3G networks were commercially available in 192 countries and 4G networks had been deployed in 102 countries.

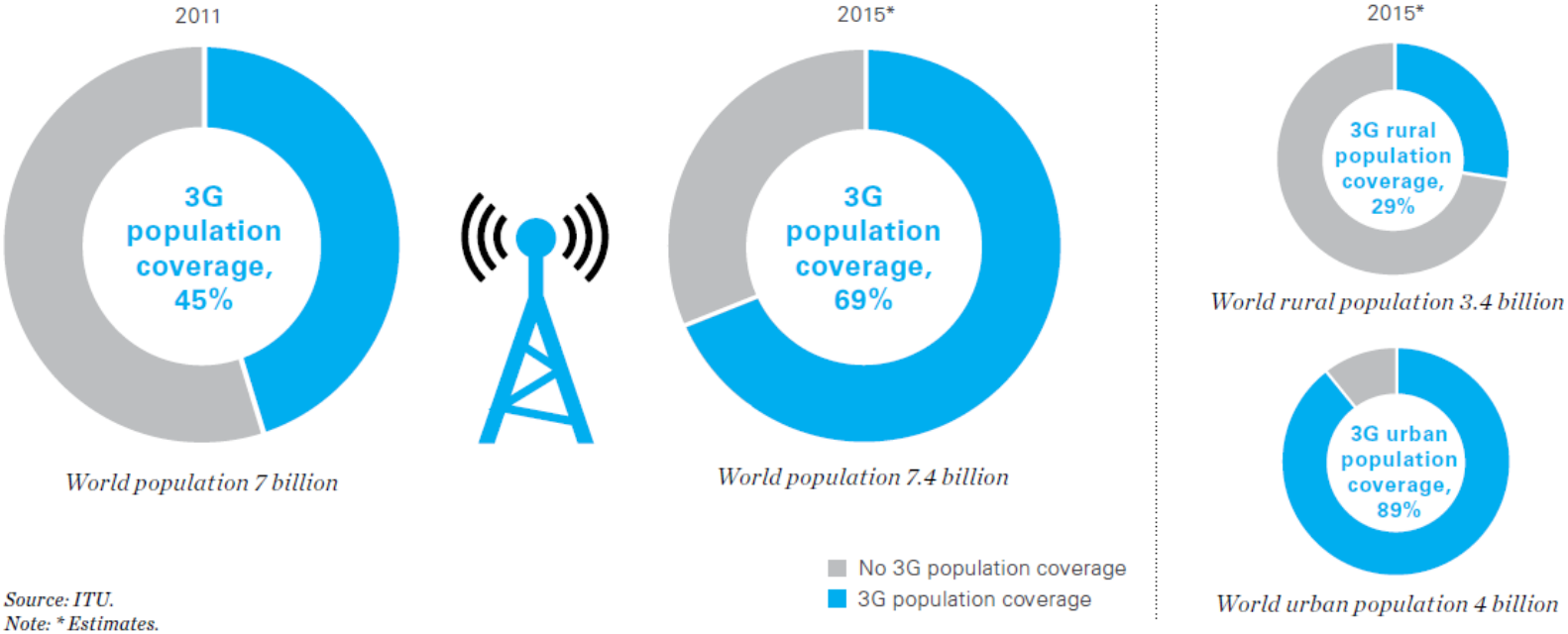


In July 2015, the Global mobile Suppliers Association (GSA) reported that 422 operators had launched commercial LTE systems in 143 countries, projecting 460 commercially launched LTE networks by end 2015.

•Sources: GSMA Intelligence, "Understanding 5G: Perspectives on future technological advancements in mobile", December 2014

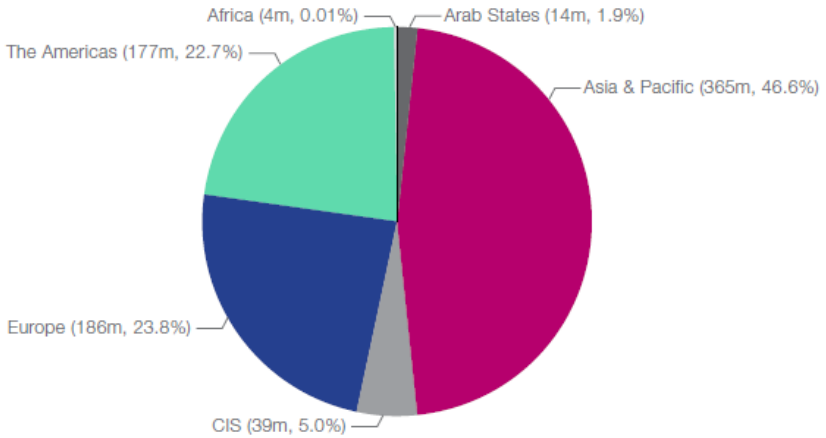
•(top); The Internet Society's "Global Internet Report 2015", based on Telegeography (bottom).

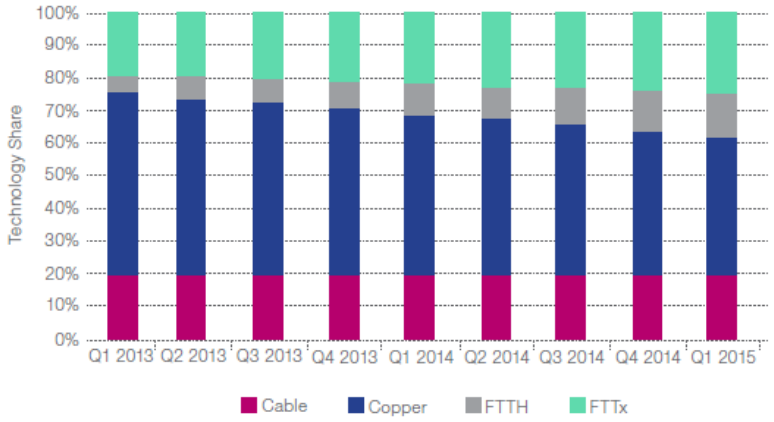
3G mobile-broadband coverage is extending rapidly and into the rural areas



Source: ITU.
*Note: * Estimates.*

Fixed Broadband Network Deployment Trends

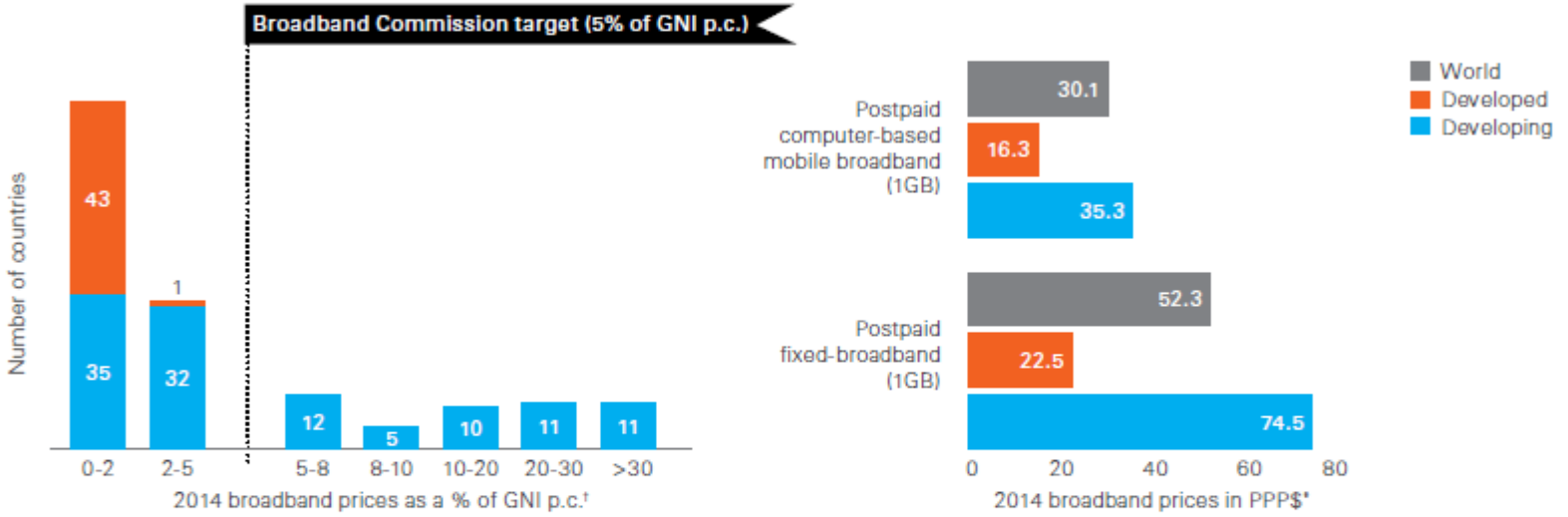




ITU estimates that there will be 794 million fixed broadband subscriptions by end 2015, representing solid growth of 6% year-on-year, up from 748 million fixed broadband subscriptions at the end of 2014.

Sources: ITU (top); Point Topic (bottom).

Broadband now affordable in 111 countries
with mobile-broadband less expensive than fixed-broadband plans

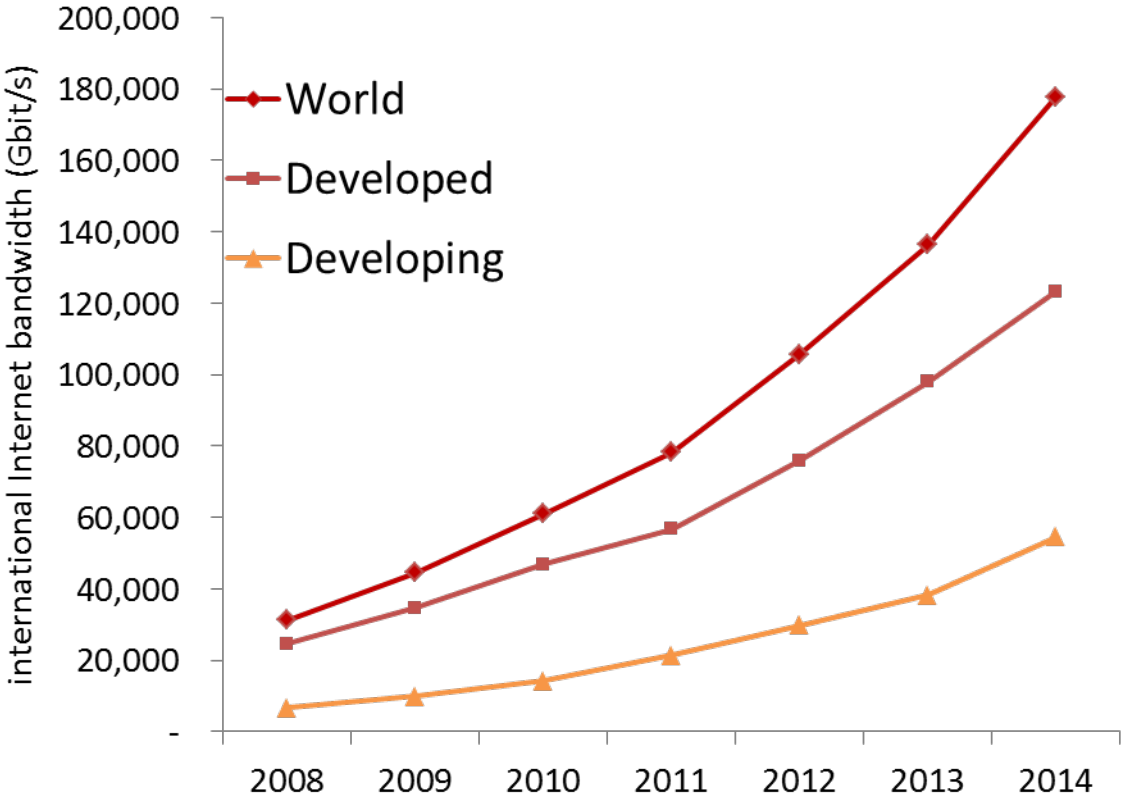


- In 2014, in 111 countries the price of a basic (fixed or mobile) broadband plan corresponds to less than 5% of average GNI per capita, thus meeting the Broadband Commission target
- The global average price of a basic fixed-broadband plan (52 PPP$) is 1.7 times higher than the average price of a comparable mobile-broadband plan (30 PPP$)
- In developing countries, average monthly fixed-broadband prices (in PPP$) are 3 times higher than in developed countries; mobile-broadband prices are twice as expensive as in developed countries

Source: ITU.
*Note: † Either fixed broadband or mobile broadband. *Based on simple averages including data for 160 economies.*

International Internet Broadband : Where are we ?

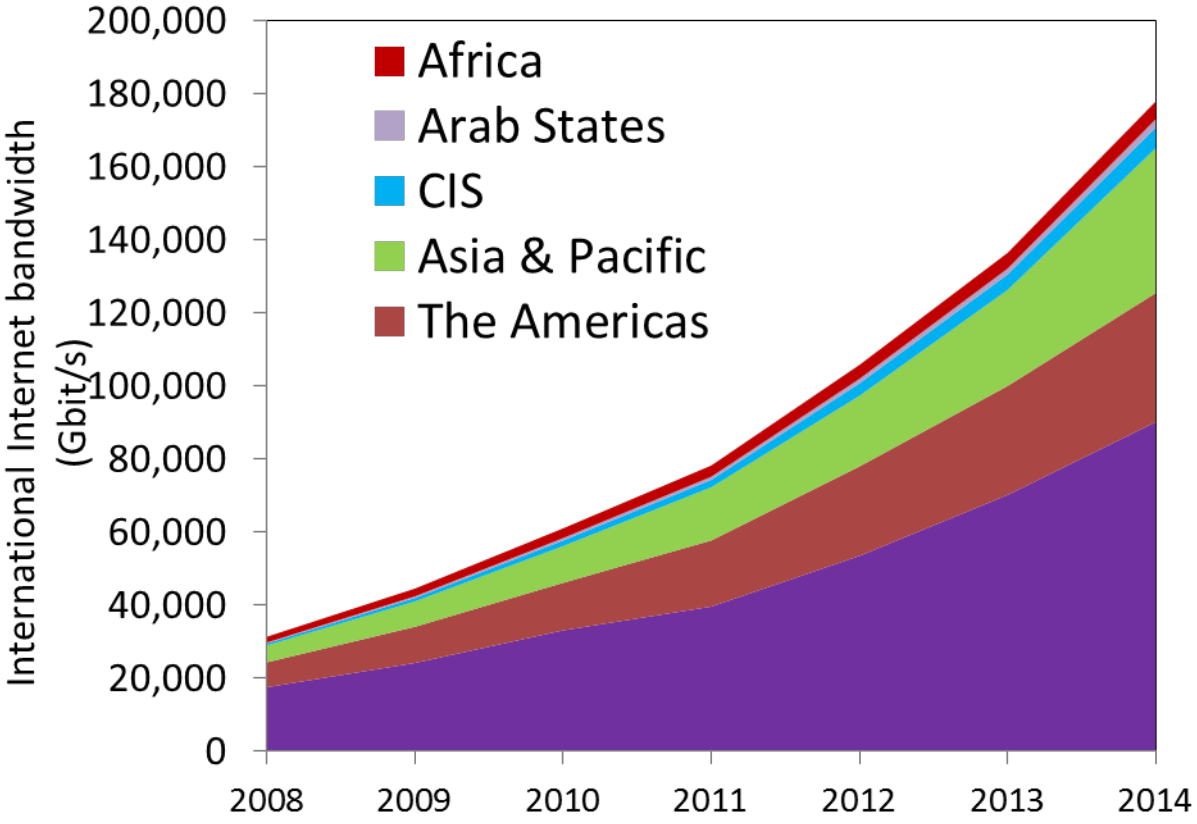
Total bandwidth growing rapidly and has more than doubled over 3 years, but most growth is in developed countries; developing countries being left behind.



Source: ITU data

International Internet Broadband : Where are we ?

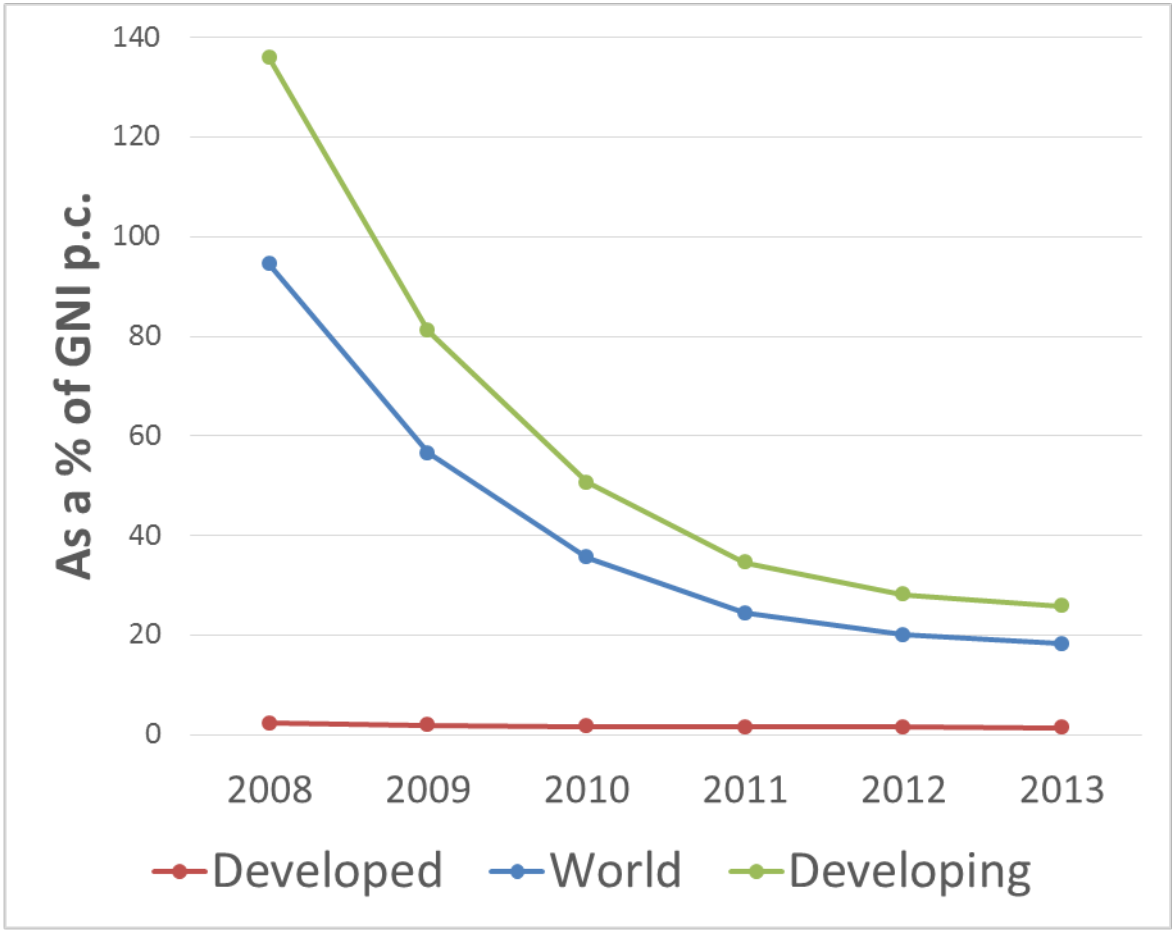
The regional breakdown shows half of total connectivity in Europe in 2014; strong growth in Asia-Pacific region from 2011-2014.



Source: ITU data

International Internet Broadband : Where are we ?

Strong reductions in price of consumer fixed broadband packages



Source: ITU data

Connected devices trends

World Map: A Growing Digital Divide in the Internet of Everything?
Connected Devices Per Capita from 2014 to 2019; Devices' Compound Annual Growth Rates (CAGR)

For every new person connecting to the Internet over the next five years, ten times as many devices will connect.

Source: Cisco VNI Global IP Traffic Forecast, 2014-2019.

A multi-tier SSC ICT architecture from communication view
(physical perspective)

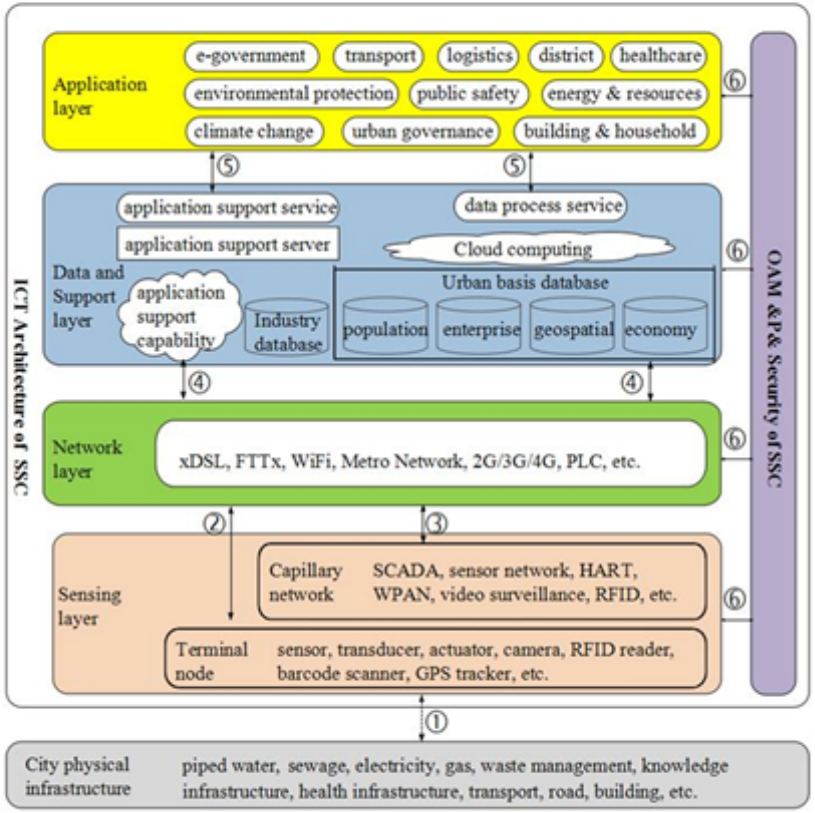
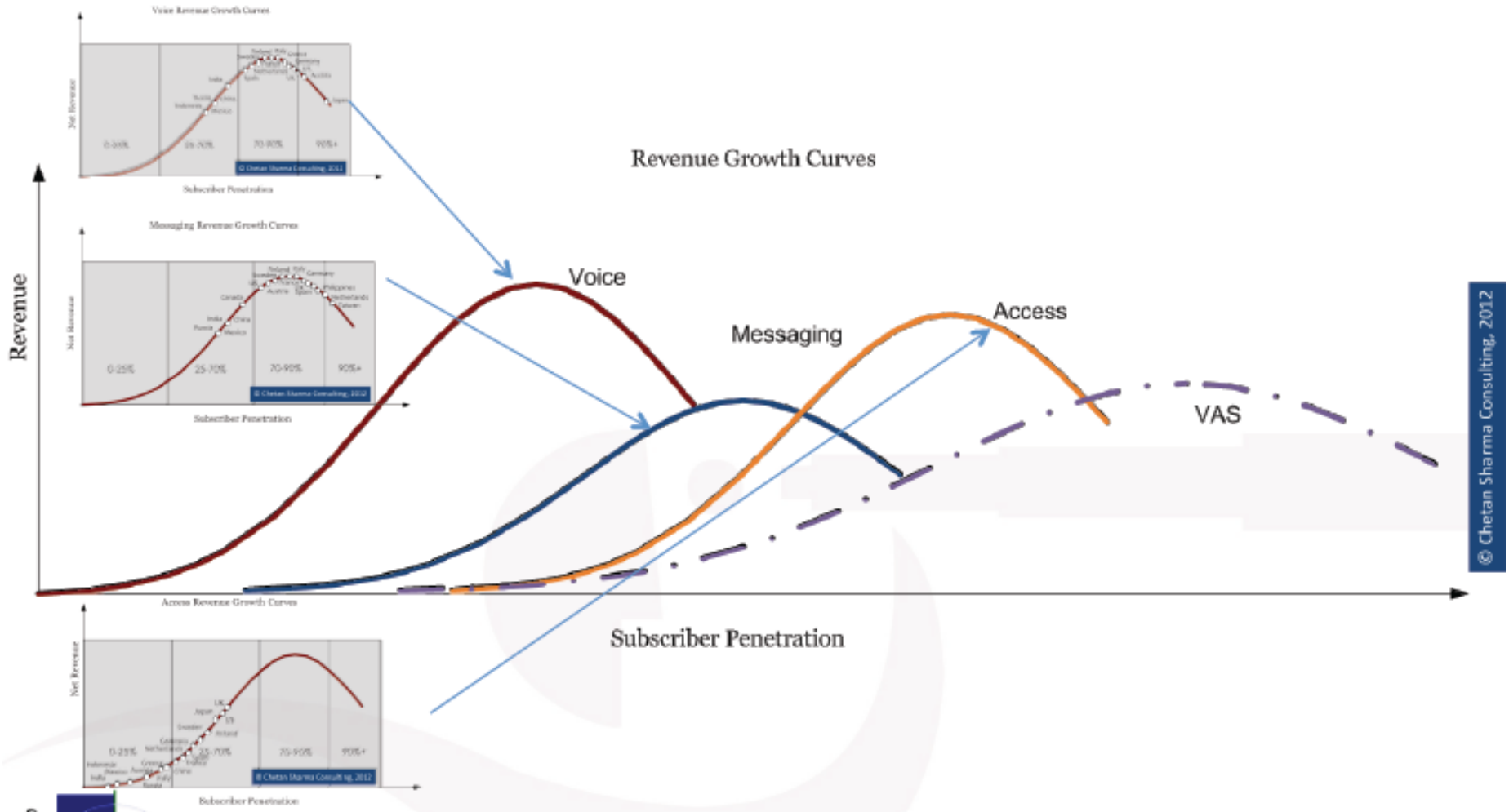


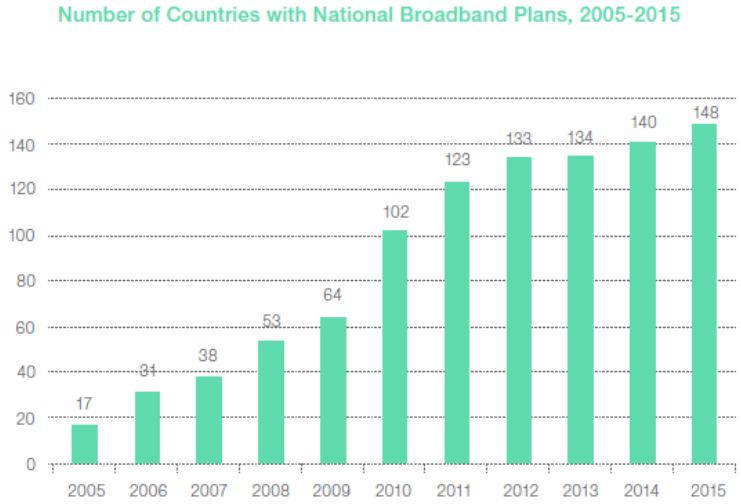
Figure source: ITU-T Focus Group on Smart Sustainable Cities: *Overview of smart sustainable cities infrastructure*

The 4th Wave: We are about to enter the golden age of mobile

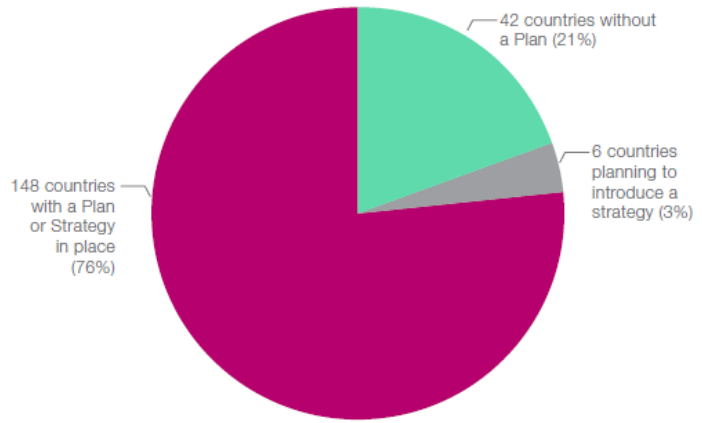


Source: Operator's Dilemma (Opportunity): The Fourth Wave

Broadband plans 2005-2015



148 governments worldwide have adopted or are planning to adopt a national broadband policy or plan.



Phase	1) Deployment	2) Adoption	3) Integration
Focus	Broadband network availability	Broadband access & capacity building for effective use	Broadband integration in economy and society
Examples	Optical fibre cable and wireless broadband access networks	Digital literacy programmes; community access projects & programmes	e-health, e-governance. e-education and e-commerce strategies
Indicators	Telecom indicators	Performance indicators	Outcome/impact measures

Source: ITU Telecommunications/ICT Regulatory Database

National Broadband Policy: Experiences from ITU

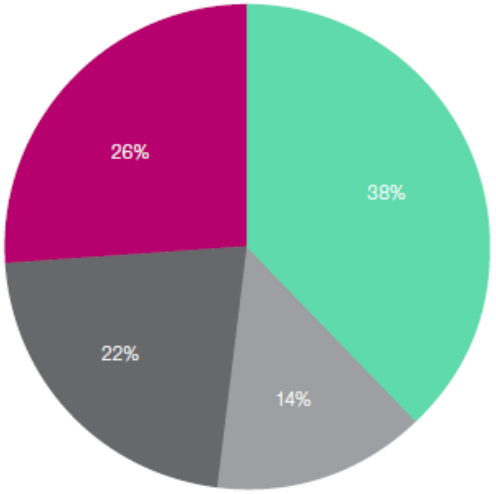
- Currently, six countries fully approved the National Broadband Policy at the highest level while the rest are close to finalizing their policy

- All these policies set out clear vision, key objectives and principles as well as short to mid-term goals and detailed implementation action plans

- Comprehensive action plans consist of a thorough list of issues (& responsible organizations and deadlines) including:
  - Broadband availability target
  - Reducing regulatory burdens
  - Review of licensing/spectrum management
  - Improving adoption, affordability
  - Universal Service Obligations
  - Sector-specific plans (e-government, e-health, e-education, e-agriculture, etc.)
  - Fostering innovation and local service/contents

Status	Country	Broadband Availability Target
✓ Approved	Bhutan	80% of the population
	Brunei D.	80% of the households by 2017
	Fiji	50% of the population by 2016
	Indonesia	75% of the population by 2017
	Papua N.G.	50% of the population by 2018
	Nepal	45% of the households by 2018
Under Review	Bangladesh	Not specified
	Cambodia	90% of the population by 2018
	Lao PDR	60% of the post offices as community access points by 2016
	Pakistan	50% of the population by 2017
In draft	Philippines	Not specified
	Marshall I.	Not specified
	Myanmar	Not specified
	Samoa	Not specified
	Vanuatu	98% of the population by 2018

Universal Service Funds (USFs) and Broadband

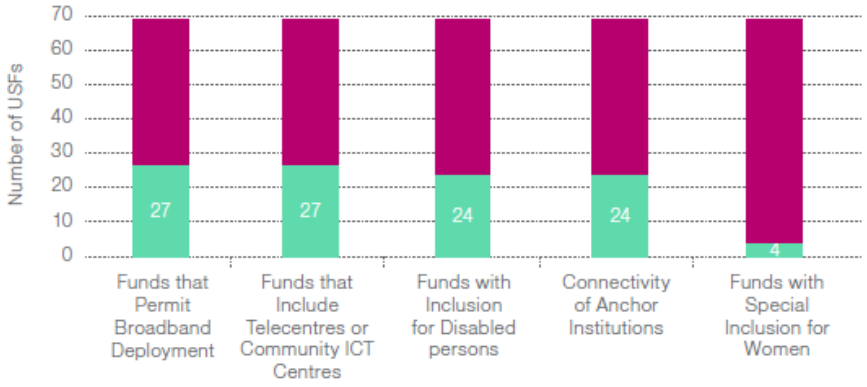


Number of Funds with High Activity Level

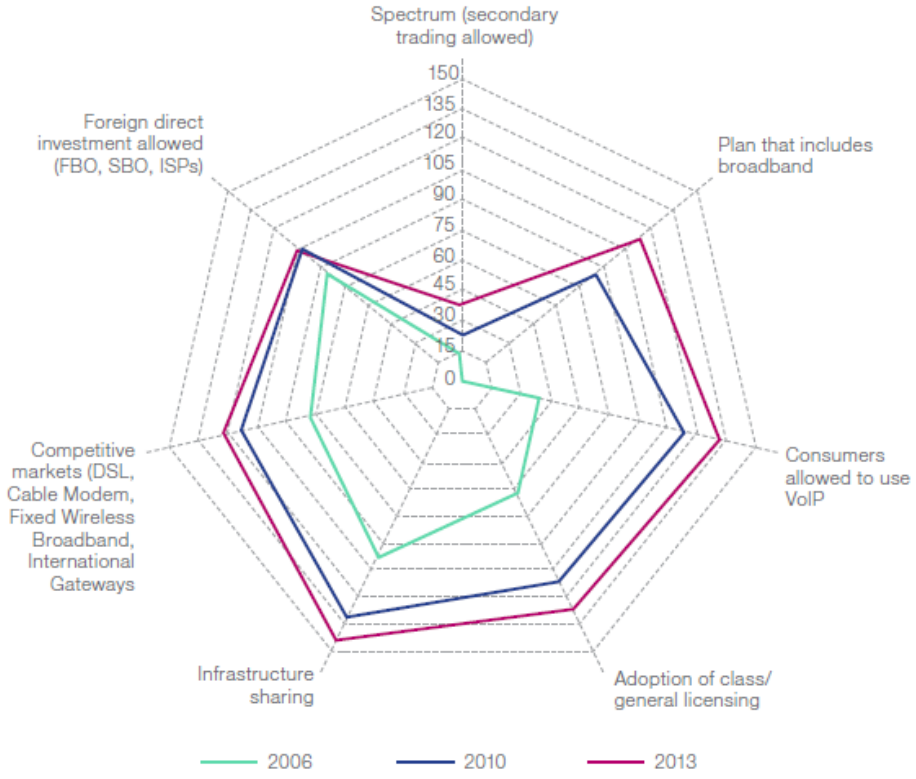
Number of Funds with Moderate Activity Level

Number of Funds with low Activity Level

Number of Inactive Funds



Source: "Universal Service Funds and Digital Inclusion for All", ITU (2013), available at: www.itu.int/en/ITU-D/Regulatory-Market/Documents/USF_final-en.pdf.



Which Regulations Shaped the ICT Sector from 2006 to 2013?

Source: http://www.itu.int/tracker

Source: ITU's Trends in Telecommunication Regulatory Reform Report, 2015..

IMT Spectrum Estimates

RATG 1: Pre-IMT, IMT-2000 and its enhancements	RATG 2: IMT-Advanced (new mobile access and new nomadic/ local area access)	RATG 3: Existing radio LANs and their enhancements	RATG 4: Digital mobile broadcasting systems and their enhancements

Total spectrum requirements for both RATG 1 and RATG 2 in the year 2020

	Total spectrum requirements for RATG 1	Total spectrum requirements for RATG 2	Total spectrum requirements RATGs 1 and 2
Lower user density settings	440 MHz	900 MHz	1 340 MHz
Higher user density settings	540 MHz	1 420 MHz	1 960 MHz

- Source: Report ITU-R M.2290-0 (12/2013)

Agreed Global Telecommunication/ICT Targets - 2020

Goal 1 Growth : Enable and foster access to and increased use of telecommunications/IC

55% of households should have access to the Internet

60% of individuals should be using the Internet

40% Telecommunications/ICT s should be **40%** more affordable

GROWTH

Goal 2 Inclusiveness – Bridge the digital divide and provide broadband for all

50% of households should have access to the Internet in the developing world; **15%** in the least developed countries

50% of individuals should be using the Internet in the developing world; **20%** in the least developed countries

40% affordability gap between developed and developing countries should be reduced by **40%**

5% Broadband services should cost no more than **5%** of average monthly income in the developing countries

INCLUSION

90% of the rural population should be covered by broadband services

Gender equality among Internet users should be reached

Enabling environments ensuring accessible ICTs for persons with disabilities should be established in all countries

Goal 3 Sustainability – Manage challenges resulting from the telecommunication/ICT development

40% improvement in cybersecurity readiness

50% reduction in volume of redundant e-waste

30% decrease in Green House Gas emissions per device generated by the telecommunication/ICT sector

SUSTAINABILITY

Goal 4 Innovation and partnership – Lead, improve and adapt to the changing telecommunication/ICT environment

Telecommunication/ICT environment conducive to innovation

Effective partnerships of stakeholders in telecommunication/ICT environment

INNOVATION

A multi-tier SSC ICT architecture from communication view
(physical perspective)

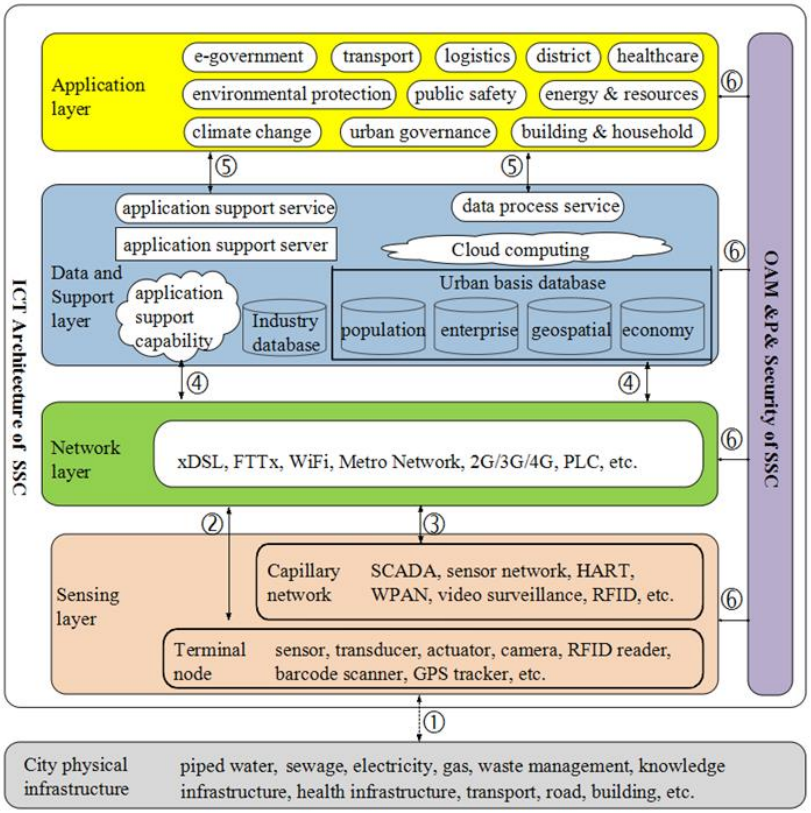


Figure source: ITU-T Focus Group on Smart Sustainable Cities: *Overview of smart sustainable cities infrastructure*

Telecom/ ICT Sector Issues (examples)

- Cross-Sector Collaboration
- Competition
- Investment
- Licensing
- Spectrum
- HetNets
- Broadband
- Cloud
- IoT / M2M
- Interoperability
- QoS/QoE
- Numbering & Addressing
- Big Data & Open Data
- Security
- Privacy
- Right of Way
- Green ICTs
- Infrastructure Sharing
- Data Centres
- e-Waste
- Emergency Telecommunications

Different Services, Different Requirements - Examples

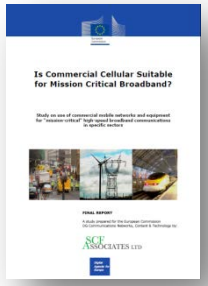
PPDR services

- **Constant availability** –
- **Ubiquitous coverage** – not just outdoors, but inside buildings (including large ferroconcrete structures such as shopping malls) and in tunnels (including subways).
- **Regionally harmonised spectrum** –
- **Differentiated priority classes** .
- **Support for dynamic talkgroups,**
- **Automatic identification with authentication.**
- **Automatic location discovery and tracking**
- **The ability to maintain connectivity**
- **Fast call setup** (<200ms) and immediate access on demand: the **Push-to-talk** (PTT)function and **all-calls** (internal broadcasts).
- **Relay capabilities**
- **Support for Air-Ground-Air (AGA) communication** when and where needed.
- **Adequate quality of service**
- **The ability to roam onto commercial networks**
- **Interworking between various PPDR services,** and increasingly, across borders.

Utility industry :

- **Teleprotection** – safeguarding infrastructure and isolating sections of the network during fault conditions whilst maintaining service in unaffected parts of the network.
- **Data monitoring** via SCADA (Supervisory, Control And Data Acquisition) systems.
- **Automation** – systems to autonomously restore service after an interruption or an unplanned situation.
- **Security** – systems to ensure the safety and security of plant.
- **Voice services** –.
- **Metering** – collecting data from smart meters and communicating with them for various reasons, such as demand management and to implement tariff changes.
- **Connectivity** – telecommunication networks to interconnect the above services in a reliable and resilient manner under all conditions.
- Other operational requirements include:
- **Coverage of all populated areas with points of presence throughout the service territory**
- **Costs must be low**
- **Continuity of service is vital,** and price stability
- **Utilities want network separation,**

Intelligent Transport Services… *and more*



What type of network is required to deliver these services?

- Private networks
- Public networks

What preparations are required to make best use of commercial networks to deliver smart services (some of them such as Emergency Telecommunication, Utilities, Transportation critical in character)?

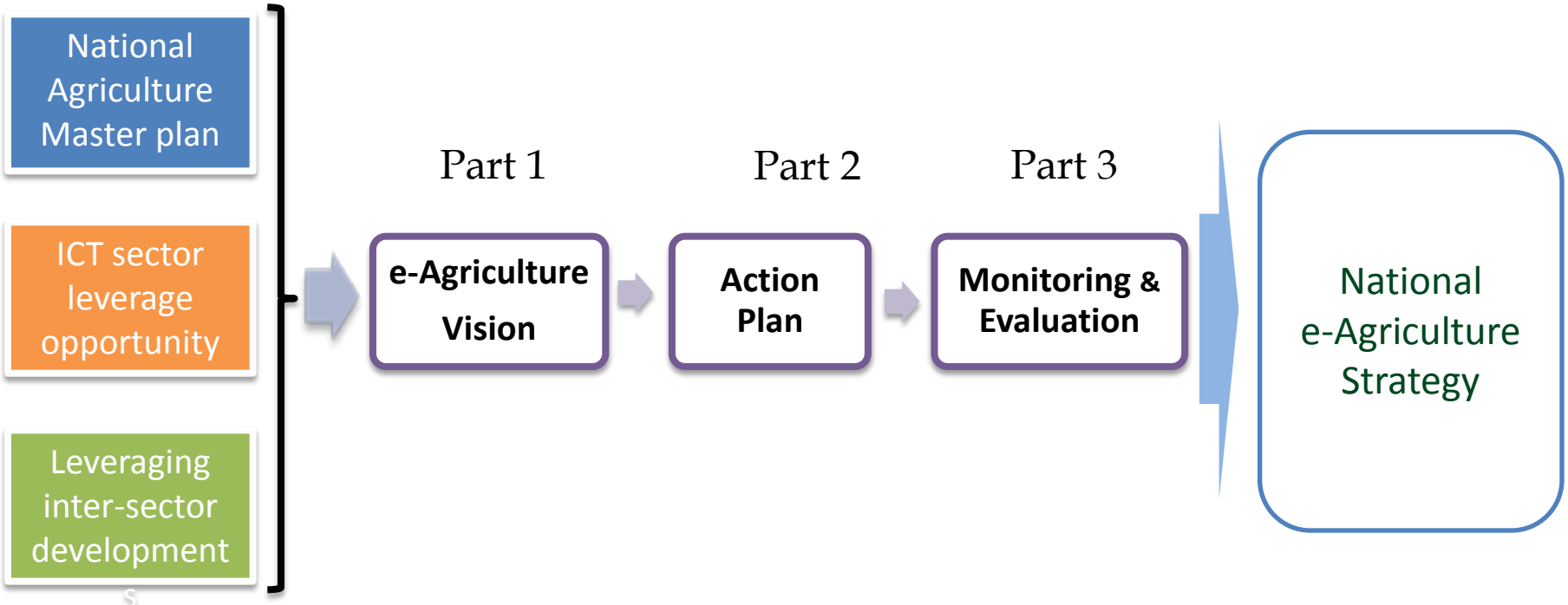
- Technical (e.g. coverage, resilience, quality, spectrum, interoperability)
- Commercial (e.g. availability, long term pricing, SLAs
- Policy & Regulatory (e.g. critical services as priority, quality of service, long term tariffs, security, privacy, USO, infrastructure sharing, licensing)

Cross-sector e-strategies: Examples of ITU experiences

e-Agriculture Strategy Guide

Implementing e-strategies requires some common requirements e.g. Cloud, Security, Privacy, Sensors, Big Data Analysis, Interoperability, Open Data, Applications Development, Digital Literacy etc.

Developing e-strategies example: E-Agriculture

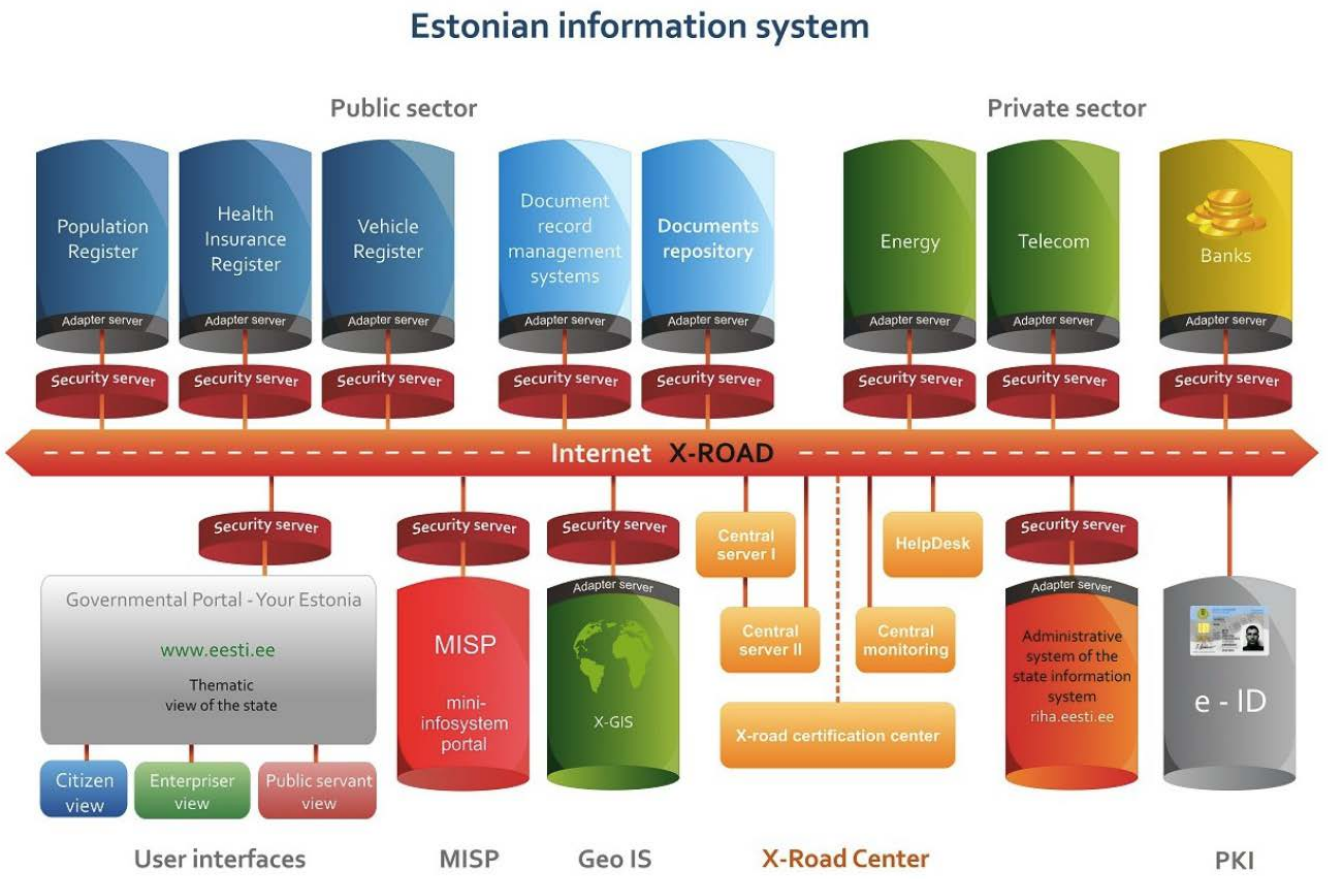


Food and Agriculture Organization of the United Nations

The final outcome is a National Strategy on e-Agriculture comprising of three parts.

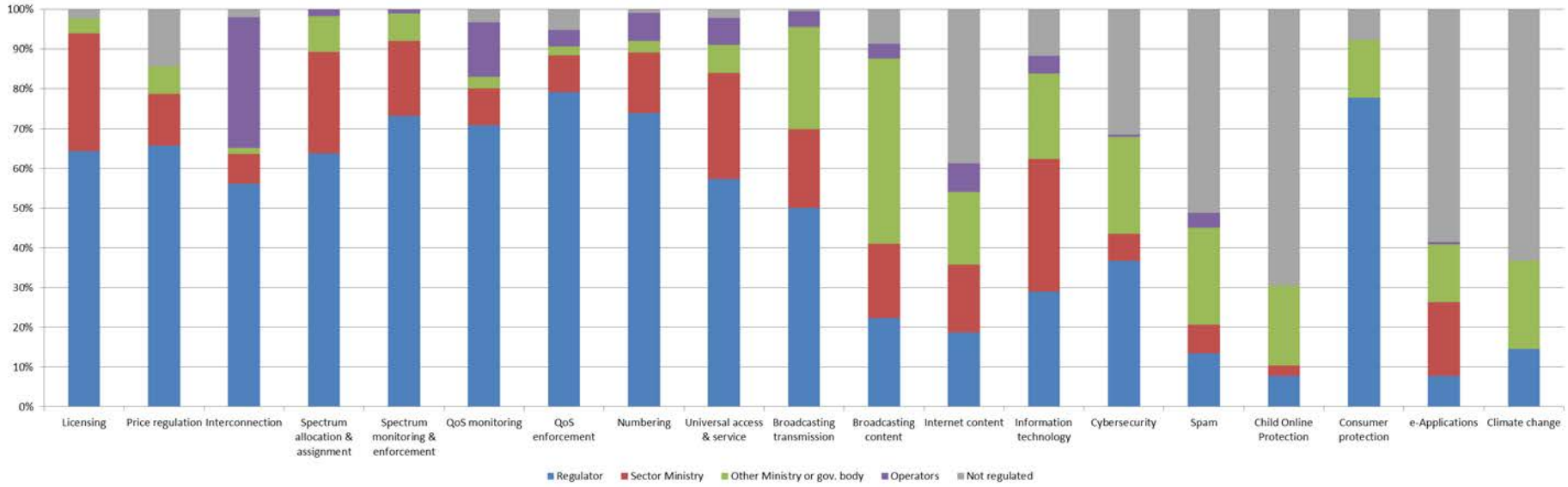
Ongoing assistances to Bhutan and Sri Lanka on development of e-Agriculture Strategy / Masterplan

Example Estonia



Source: https://www.ria.ee/public/x_tee/xRoadOverview.pdf/

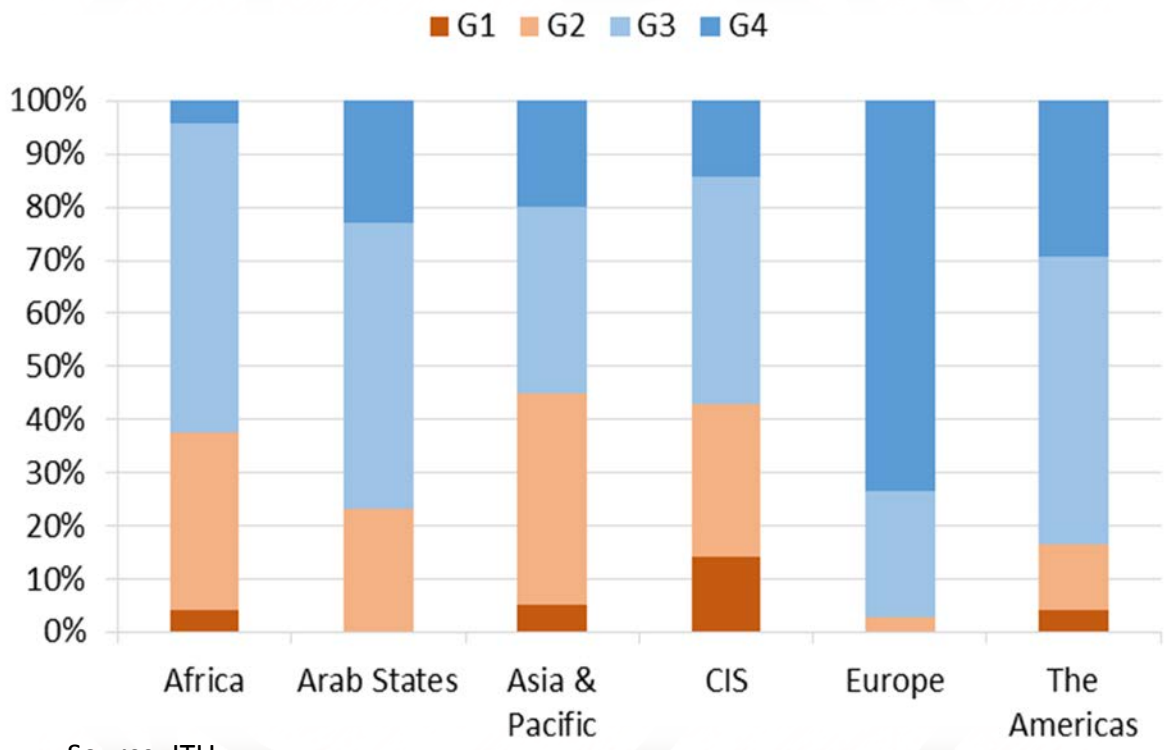
Regulatory Mandate, 2013



Source: ITU World Telecommunication Regulatory Database

Beginning of 2014

Maturity of Regulation



Source: ITU.

G4: Integrated regulation – led by economic and social policy

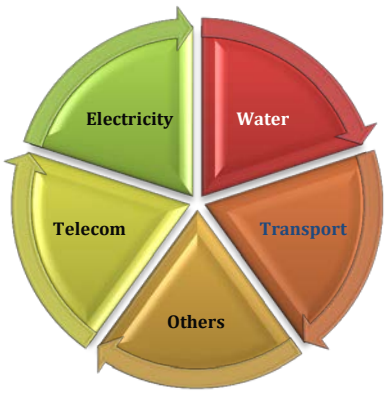
G3: Enabling investment, innovation and access – dual focus on stimulating competition in service and content delivery, and consumer protection

G2: Basic reform – partial liberalization and privatization across the layers

G1: Regulated public monopolies– command and control approach

SMART SUSTAINABLE CITIES

REGULATORY COLLABORATION



MULTI UTILITY REGULATOR

Collaboration Mechanisms


Emergency


Education


Health


Electricity

Governance

- Integrated Policy
- Legislation
- Co-Regulation
- Standardization (International / National)
- MoU or Cooperation Agreement
- Coordination Committee
- Projects, Coordination on Case to Case basis

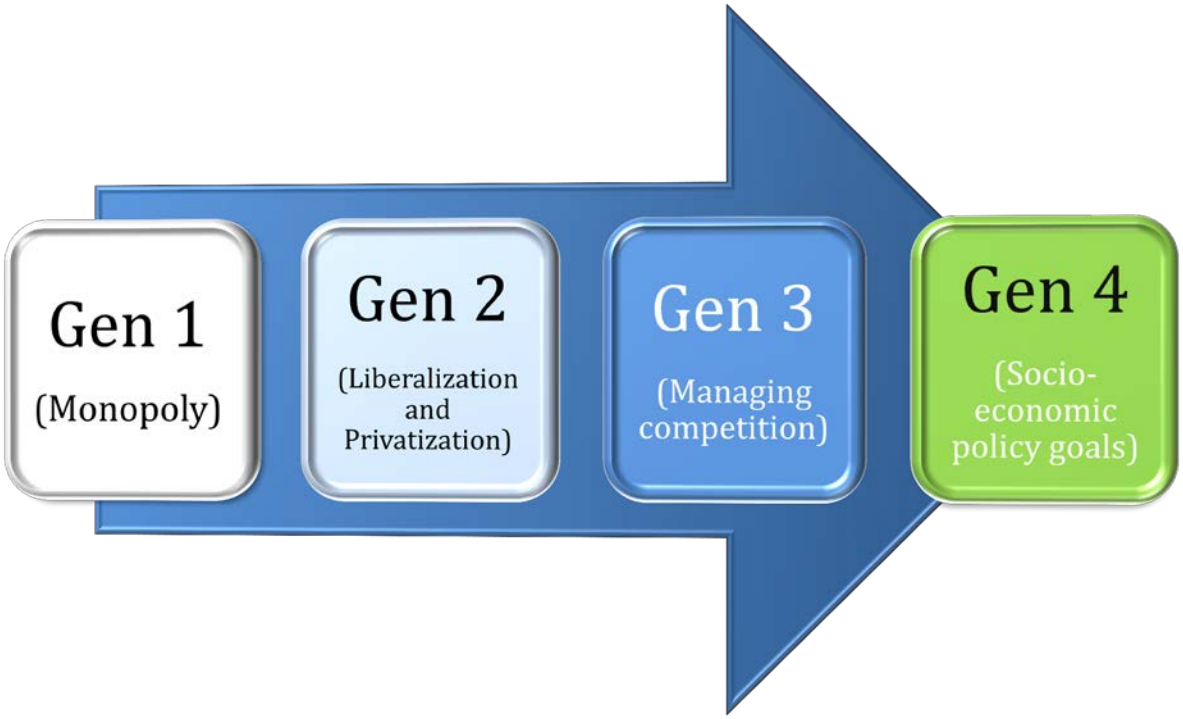

Transport, Trade, Logistics


Water


Teleworking


Infrastructure Security

Regulation 4.0 - GSR 13 Best Practices

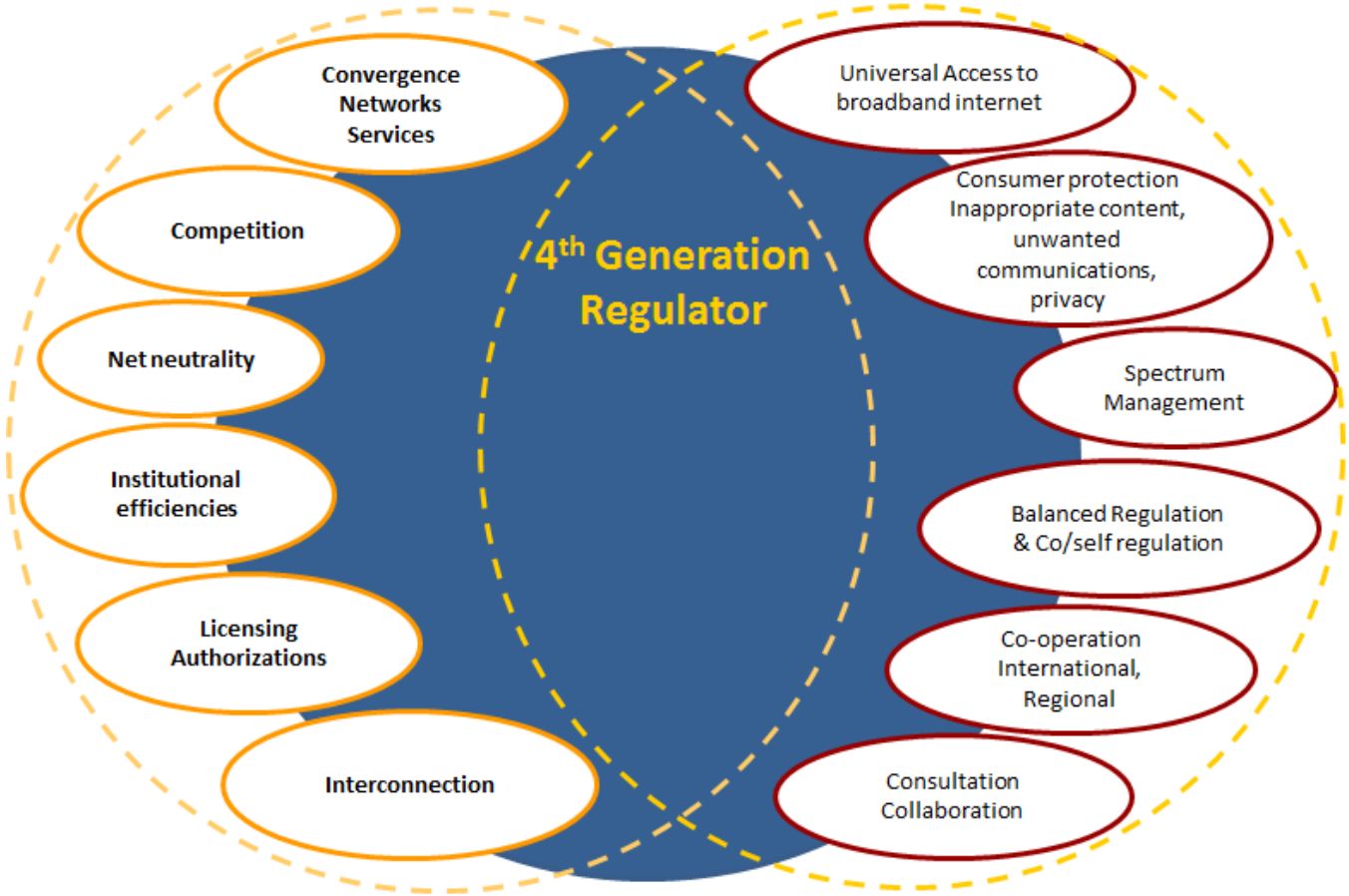


1 Innovative and smart regulatory approaches fostering equal treatment of market players without putting extra burden on operators and service providers

2 The evolving role of the regulator: the regulator as a partner for development and social inclusion

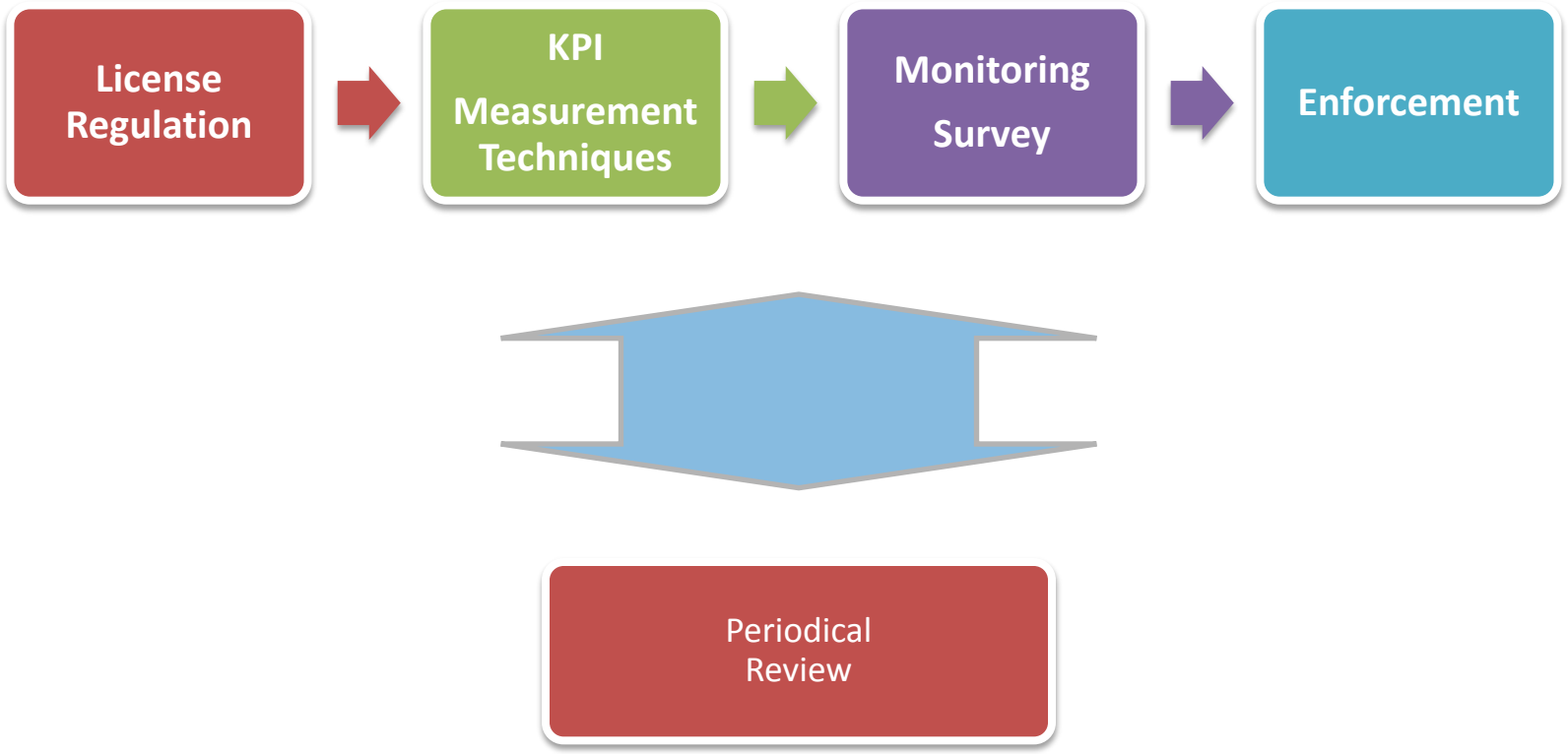
3 The need to adapt the structure and institutional design of the regulator to develop future regulation

Regulation 4.0



QUALITY OF SERVICE

Quality of Service Regulatory Framework



Quality of Service Regulatory Framework

- Standards
  e.g. ITU, ETSI, National Standards, Industry Standards, Other standardization bodies

- License condition
  e.g. India, Pakistan,
- Regulation
  e.g. India, Malaysia, Pakistan, Singapore, Tanzania
- Industry guidelines
  e.g. Australia

- Technical
  e.g. Call drop, call success rate, connection speed, SMS quality
- Customer focused
  e.g. Billing accuracy, fault
- Guideline
  e.g. Measurement methods

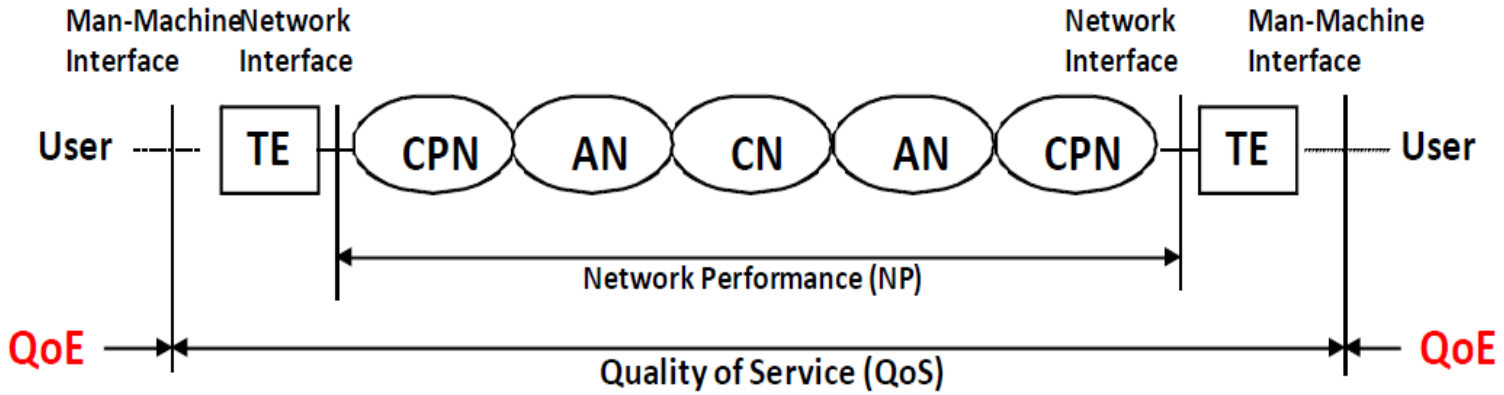
- Technical
  e.g. Network auditing, drive tests
- Customer survey
  e.g. Network auditing, drive tests

- Regulatory notice
  e.g. Website, Press release, Directive
- Publication
  e.g. Website, newspaper
- Penalty
- Dispute

Quality of Experience (QoE)

- QoE "The overall acceptability of an application or service, as perceived subjectively by the end user."

- QoE has a dependency of end user perception as well as features of services, thus it could have quite different ways to specify the value. But it is clear QoE should be impacted from the QoS and NP even though end user perception is subjective.



CN: Core Network, AN: Access Network, CPN: Customer Premise Network, TE: terminal Equipment

Figure 3 – Relationship among NP, QoS and QoE

Committed to connecting the world

What would you like to search for?

150 1865 2015

Measurements of Internet speed

Background

The measurement of Internet speed becomes an important matter, when ICT players (e.g. operators, regulators, customers) try to assess whether it is compliant with the speed value indicated in relevant customer's Service Level Agreement (SLA).

The Internet's access speed is normally advertised by fixed and mobile operators, however in most cases customers do not have a global standardized mechanism to verify it.

Currently, the Internet provides various ways to assess the Internet speed. However most of them measure the speed between customers and servers which are located outside of the operator's network, therefore this measure can't be compared with the value written in the customer's SLA.

Actually, customers are mostly interested in the assessment of the access speed to a particular Internet service (e.g. movie on YouTube, TV on Google TV, web surfing, etc.), as this would allow them to compare the offers from various operators.

Taking all this into account, the development of a unified approach to measure the Internet speed would be advantageous.The establishment of such a framework would inspire greater consumer confidence in advertised speeds and ensure that accurate comparisons can be made between offerings from different operators.

This webpage provides all interested parties with ITU-T's relevant activities on Internet speed measurements.

DESCRIPTION OF ISSUE

As the accessibility of Internet resources is important for customers, this resource contains a description of the common issues of the existing global Internet measurement systems which are not suitable for managing the customer's SLA.

BEST PRACTICE

Some regions and countries have successfully launched their own approaches aiming to evaluate Internet access speed.

The Organization for Economic Co-operation and Development (OECD) generated a list of countries which

Related links | Presentations and reports | News

- Framework
- Testing methodologies
- Presentation of Q.Int_speed_test *(JCA-CIT, 26 Nov 2014)*
- ITU newslog

Forthcoming events

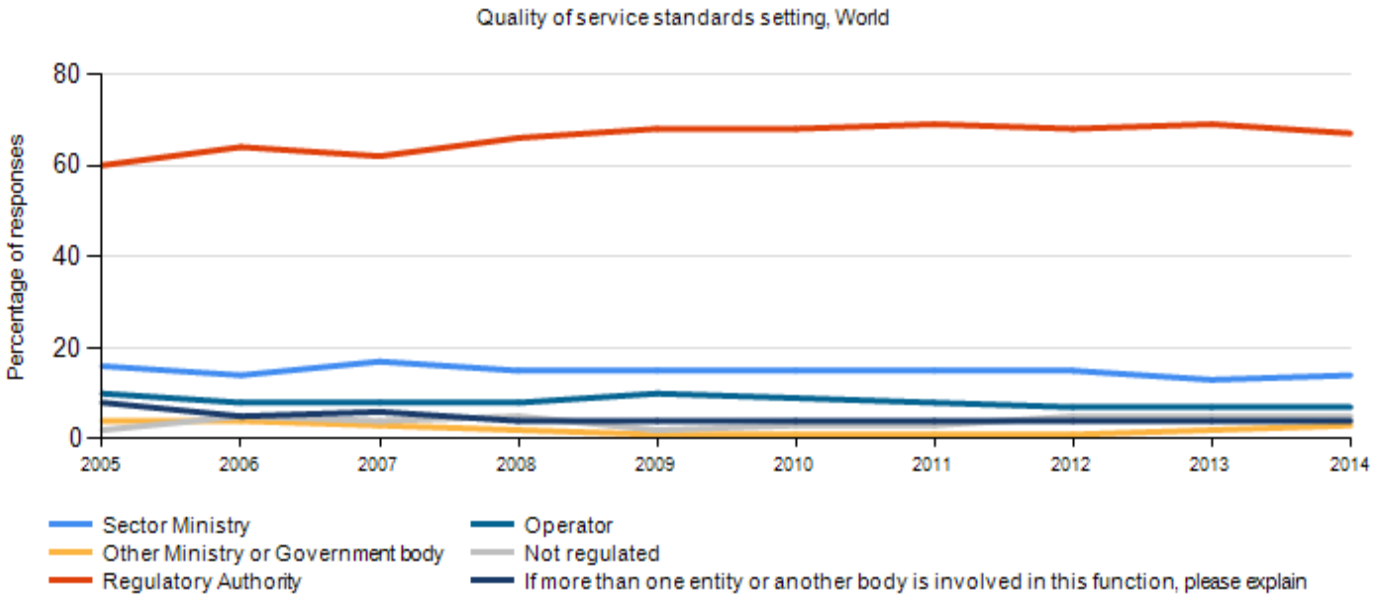
SG11 meeting ***New***
2-11 December 2015

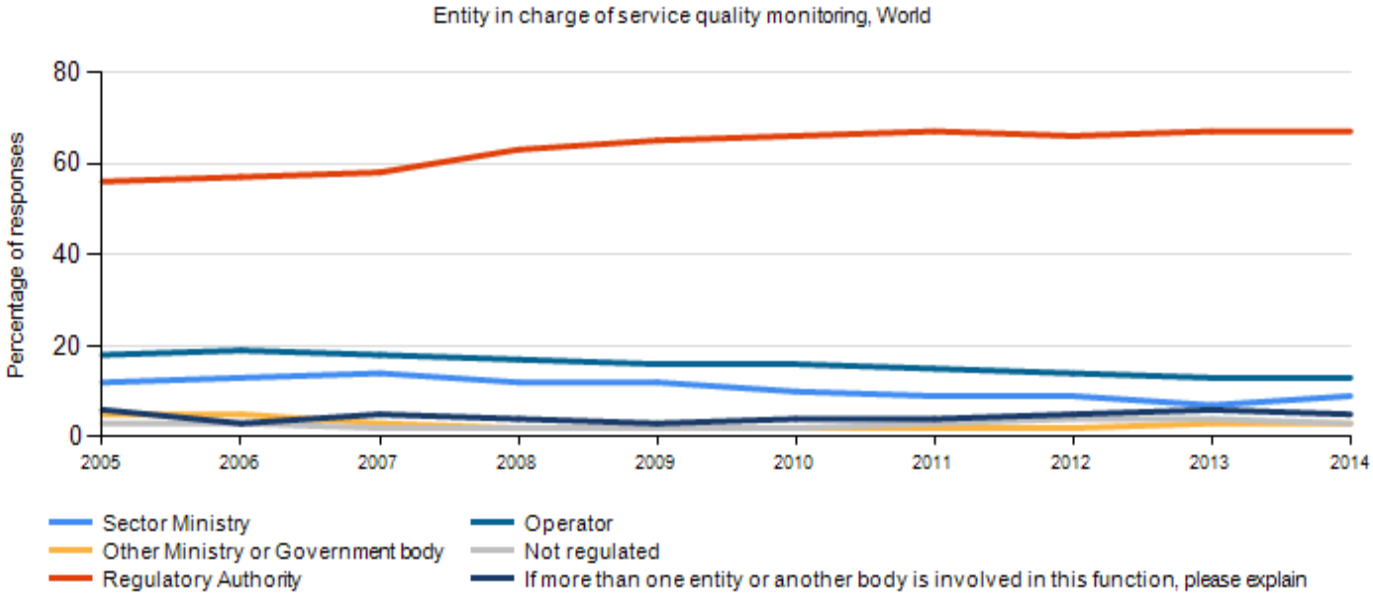
QUICK LINKS

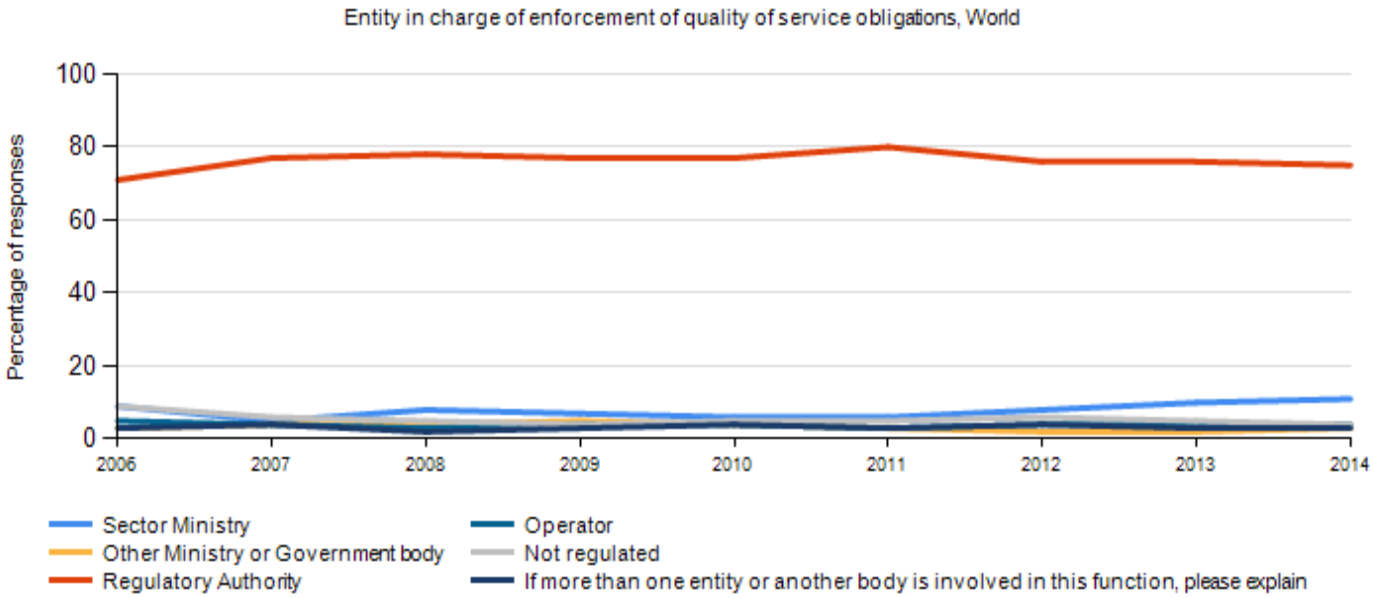
- ITU C&I Portal
- ITU testing events
- ITU-T SG11 "Protocols and test specifications"

HOW TO PARTICIPATE

Experts who are interested in participating in these activities are invited to send contributions to Question 15 of ITU-T Study Group 11 and may subscribe here to the Q15/11 mailing list t13sg11q15@lists.itu.int


Quality of service standards setting, World
Percentage of responses
80
60
40
20
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Sector Ministry
Other Ministry or Government body
Regulatory Authority
Operator
Not regulated
If more than one entity or another body is involved in this function, please explain


Entity in charge of service quality monitoring, World
Percentage of responses
80
60
40
20
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Sector Ministry
Other Ministry or Government body
Regulatory Authority
Operator
Not regulated
If more than one entity or another body is involved in this function, please explain


Entity in charge of enforcement of quality of service obligations, World
Percentage of responses
100
80
60
40
20
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
Sector Ministry
Other Ministry or Government body
Regulatory Authority
Operator
Not regulated
If more than one entity or another body is involved in this function, please explain

		Number of countries/economies						
		Africa	Arab States	Asia & Pacific	CIS	Europe	The Americas	Total
Services subject to quality of service monitoring *	Fixed wireline	24	9	20	3	32	25	113
	Fixed wireless	20	9	14	3	15	21	82
	Mobile	32	14	22	3	24	25	120
	Dial-up internet access	20	8	14	1	11	12	66
	Broadband internet access	24	12	18	3	19	18	94
	Telephony interconnection	22	5	8	1	7	19	62
	Internet interconnection	14	5	8	1	3	14	45
	Leased lines	17	7	11	1	11	14	61
	Pay phones	14	2	7	1	15	12	51
	All regulated services	0	0	0	0	0	0	0
	Other	1	0	3	0	10	4	18
Region size		44	21	40	12	43	35	195

Source: ITU World Telecommunication/ICT Regulatory Database

ITU ICT-Eye: http://www.itu.int/icteye

		Number of countries/economies						
		Africa	Arab States	Asia & Pacific	CIS	Europe	The Americas	Total
Quality of service monitoring required	Yes	37	14	28	6	37	30	152
	No	1	1	2	2	5	3	14
Operator/service providers subject to quality of service monitoring *	Incumbent	22	7	14	2	8	13	66
	Mobile cellular operators	29	9	18	2	14	14	86
	Dominant or Significant Market Power (SMP) operator(s)	12	6	12	1	6	9	46
	Universal Service/Access operator(s)	10	4	10	0	20	6	50
	Any operator with a network but not a service provider without a network (for example, a mobile virtual network operator or a calling card service provider)	13	2	6	0	3	6	30
	Any operator or service provider	19	7	17	3	10	16	72
	Other	2	1	6	1	13	5	28
Region size		44	21	40	12	43	35	195

* This indicator allows multiple choice per country/economy

Source: ITU World Telecommunication/ICT Regulatory Database

ITU ICT-Eye: http://www.itu.int/icteye

It is commendable that authorities in a growing number of OECD countries are developing tools to fit their policy needs as well as providing greater information to all stakeholders. A list of official measurement projects can be found in the table below. A detailed version as of January 2014 is included in the full report.

Speed tests: Official measurement projects in OECD area
Last update: March 2015

Country	Authority	Approach(es)		Purpose(s)					Links
		Fixed or unspecified broadband	*Mobile broadband*	*1. Consumer empowerment*	*2. Network development*	*3. Competition enhancement*	*4. Net neutrality*	*5. Others*	
Australia	Department of communications	EAM	EAM					x	Project page
Austria	RTR	EAM	EAM	x	x	x	x		Project page
Canada	CRTC	EDM		x	x				Project page
Czech Rep.	CTU		PSM-ISP and PSM for comparison	x	x	x		x	http://lle.ctu.cz/
Denmark	Danish Business Authority	EAM	EAM	x		x			Project page
France	ARCEP	PSM-ISP	PSM	x	x	x	x		Project page
Germany	Bundesnetzagentur	PSM (-2013) EAM (2015-)	PSM (2012); EAM (2015-)	x	x	x	x		2012 and 2013 2015-
Greece	EETT	PSM and EAM	PSM and EAM	x	x		x		Project page
Italy	AGCOM	EAM and PSM for check	PSM	x	x	x			Project page
Korea	Ministry of Science, ICT and Future Planning	PSM and PSM-ISP	PSM	x				x	Project page
New Zealand	Commerce Commission	EDM		x	x	x			Project page
Norway	Norwegian Communications Authority (Nkom)	EAM	EAM	x	x				Project page
Portugal	ANACOM	EAM	EAM	x	x	x	x		Project page
Slovenia	AKOS	EAM		x	x	x	x		Project page
Spain	Ministry of Industry, Energy and Tourism	PSM-ISP	PSM-ISP	x					Project page
Turkey	Information and Communication Technologies Authority of Turkey	PSM-ISP		x	x	x			*n.a.*
United Kingdom	OFCOM	EDM	PSM	x	x				Project page

** Note:*

1. Measurement approaches are categorized as follows:

- End-user Application Measurement (EAM): Daily use of an end-user's computer or mobile phone is employed for measurement with an application or browser under the user's control.
- End-user Device Measurement (EDM): Tests are done by specific devices which are installed by end users for measurement, but they are separated from the daily use of computers and mobile phones thus controlled remotely by the project, and
- Project Self Measurement (PSM): The project itself installs or allocates and controls a device or computer to do tests. Unless otherwise noted, measurements are done by some entity different from the measured ISPs, but if it is done by the ISPs themselves with controlled methodology then the document calls it PSM-ISP for distinction.

2. Country notes are as follows.

Purpose of Measurement

OECD