



ICT Trends for Smart Society and the Pacific Context

ITU ASP COE Senior Management Training On Telecom Strategy for the Pacific – Next Five Years

16-18 November 2015
Nadi, Fiji



Australian Government

Department of Communications and the Arts



150 1865
ITU 2015



ITU: A brief overview

193 Member States

567 Sector Members

159 Associates

60 Academia

ITU-R: ITU's Radio-communication Sector globally manages radio-frequency spectrum and satellite orbits that ensure safety of life on land, at sea and in the skies.



ITU-T: ITU's Telecommunication Standardization Sector enables global communications by ensuring that countries' ICT networks and devices are speaking the same language.



Headquartered in Geneva,

4 Regional Offices

7 Area Offices.

ITU-D: ITU's Development Sector fosters international cooperation and solidarity in the delivery of technical assistance and in the creation, development and improvement of telecommunication/ICT equipment and networks in developing countries.

ITU: Elected Officials



Mr. Houlin Zhao
ITU Secretary-General



Mr. Malcolm Johnson
ITU Deputy Secretary-General



Mr. Brahim Sanou
Director
Telecommunication Development Bureau



Mr. Francois Rancy
Director
Radiocommunication Bureau



Mr. Chaesub Lee
Director
Telecom Standardization Bureau



IMPROVING QUALITY OF LIFE..



Emergency



Education



Health



Agriculture



Investment



Applications



Policy & Regulation



Governance



Transport



Sensor Networks



Universal Broadband



Green ICT & E-Waste



Capacity Building



Measurements



Electricity



**SMART
SOCIETY**



Infrastructure Security



Privacy & Security



Water



Digital Inclusion



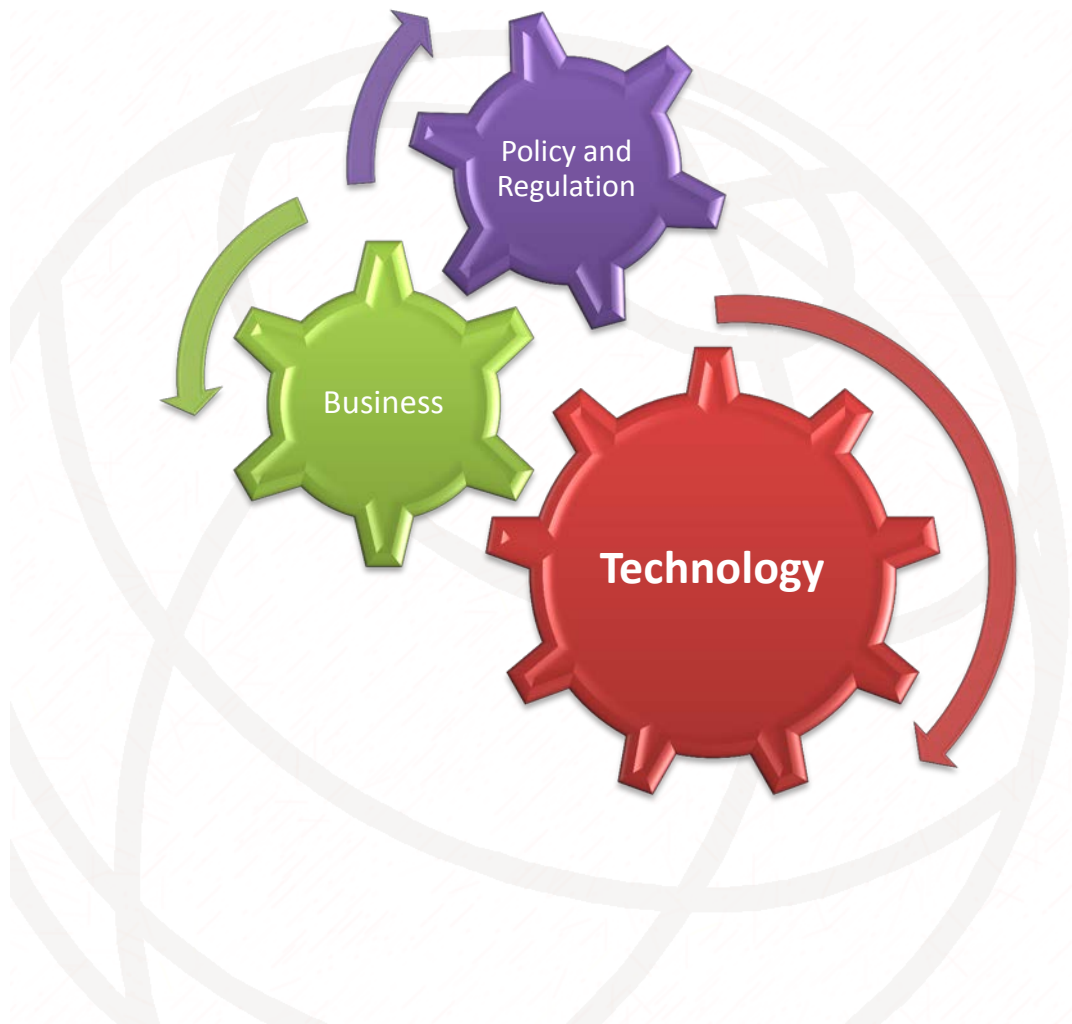
Spectrum Management



Standards, Conformity & Interoperability



Teleworking

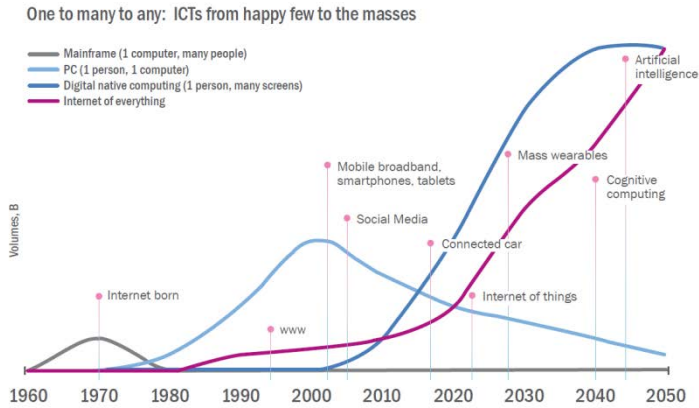


Technologies, **B**usinesses,
Policies and **R**egulations

form the key drivers and a
strategy needs to align these..

1st some global trends

History of the future



Source: ITU



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.

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) ^a	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);	--/--

Broadband Network Deployment Trends

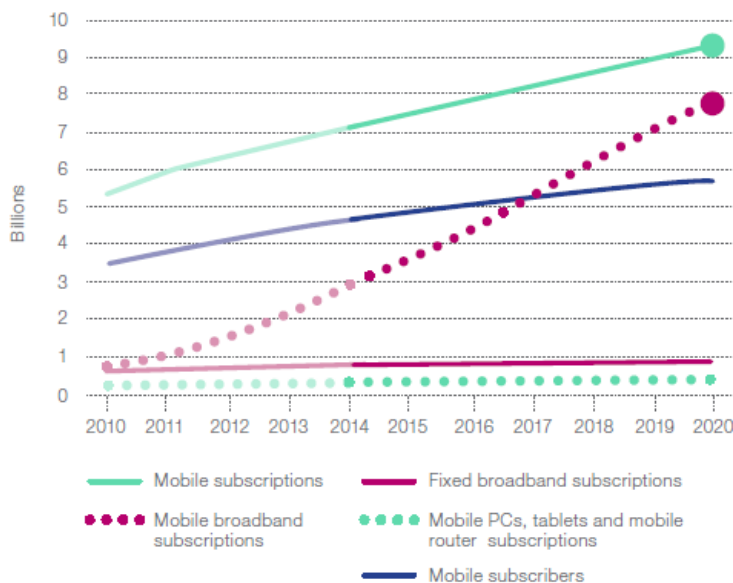
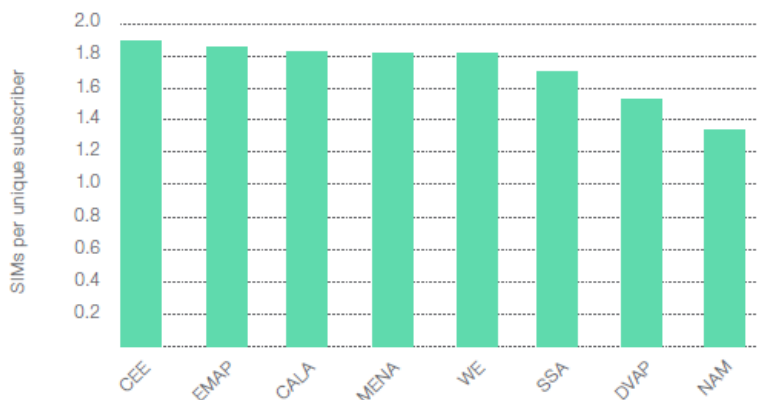


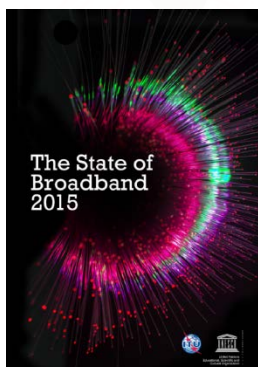
Figure 4: Comparing Global Subscriptions with Subscribers

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

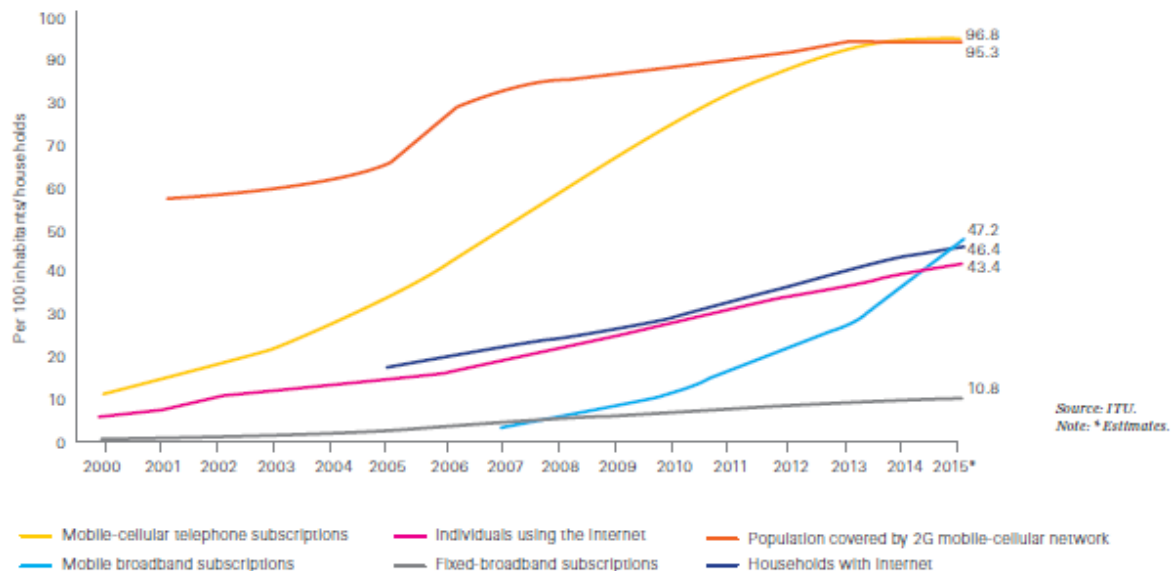
Sources: Ericsson Mobility report, June 2015 (top); the Internet Society's "Global Internet Report 2015", based on GSMA (bottom).



- 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

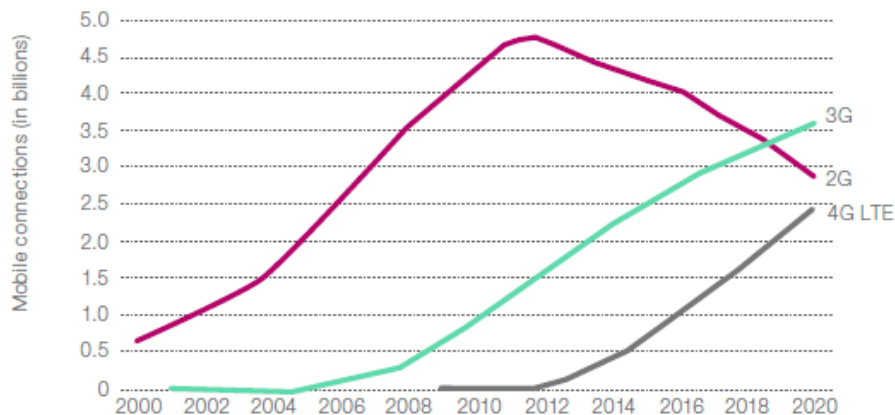


15 years of ICT growth: what has been achieved?



- 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

Mobile Broadband Network Deployment Trends



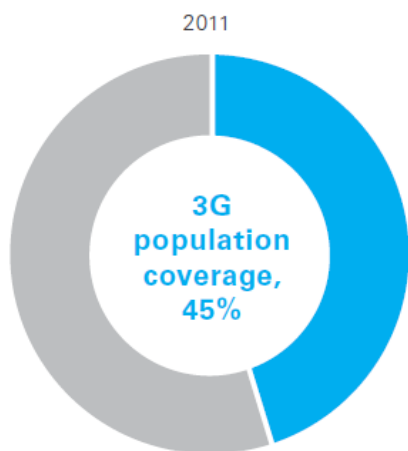
By the end of 2014, Telegeography reports that 2G networks had been deployed in 200 countries, active 3G networks were commercially available in 192 countries and 4G networks had been deployed in 102 countries.



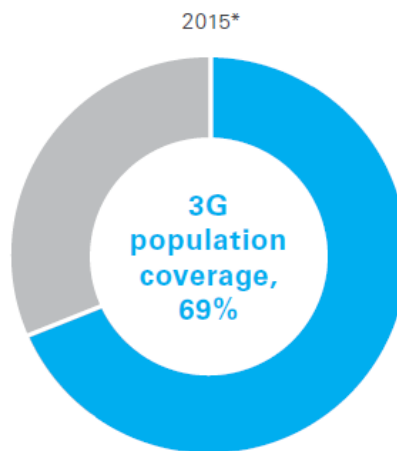
In July 2015, the Global mobile Suppliers Association (GSA) reported that 422 operators had launched commercial LTE systems in 143 countries, projecting 460 commercially launched LTE networks by end 2015.

•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).

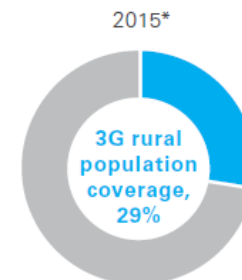
3G mobile-broadband coverage is extending rapidly and into the rural areas



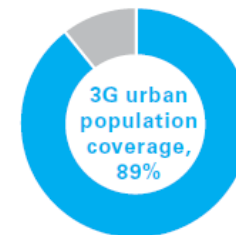
World population 7 billion



World population 7.4 billion



World rural population 3.4 billion

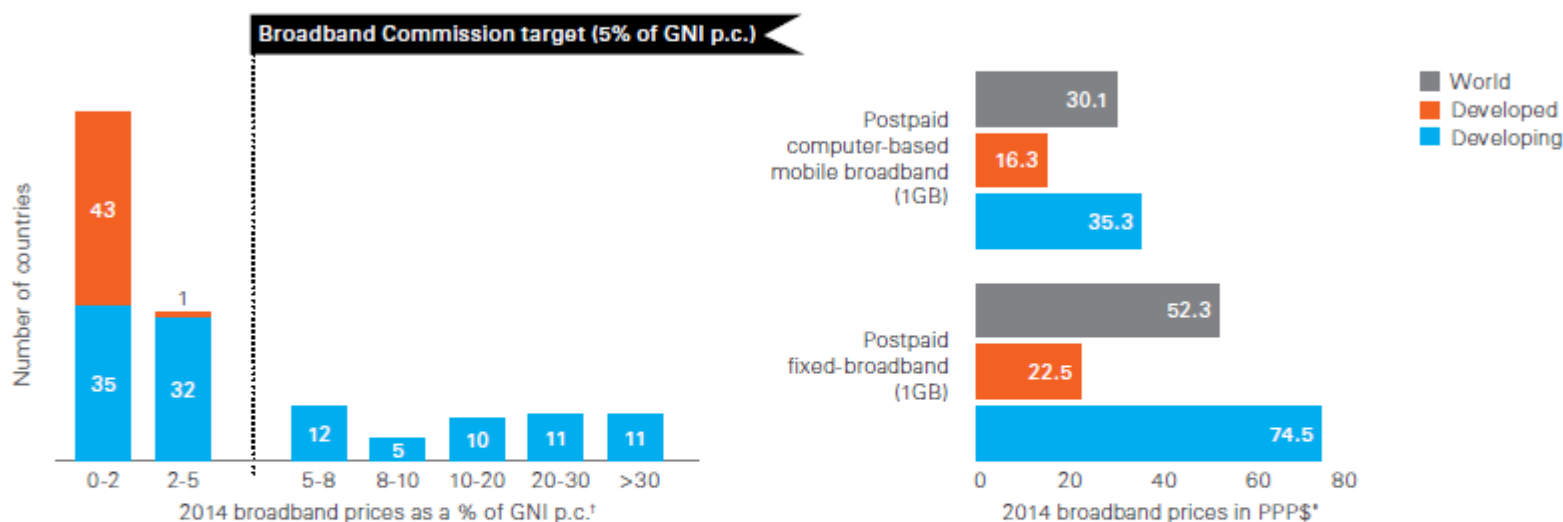


World urban population 4 billion

Source: ITU.
Note: *Estimates.

■ No 3G population coverage
■ 3G population coverage

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

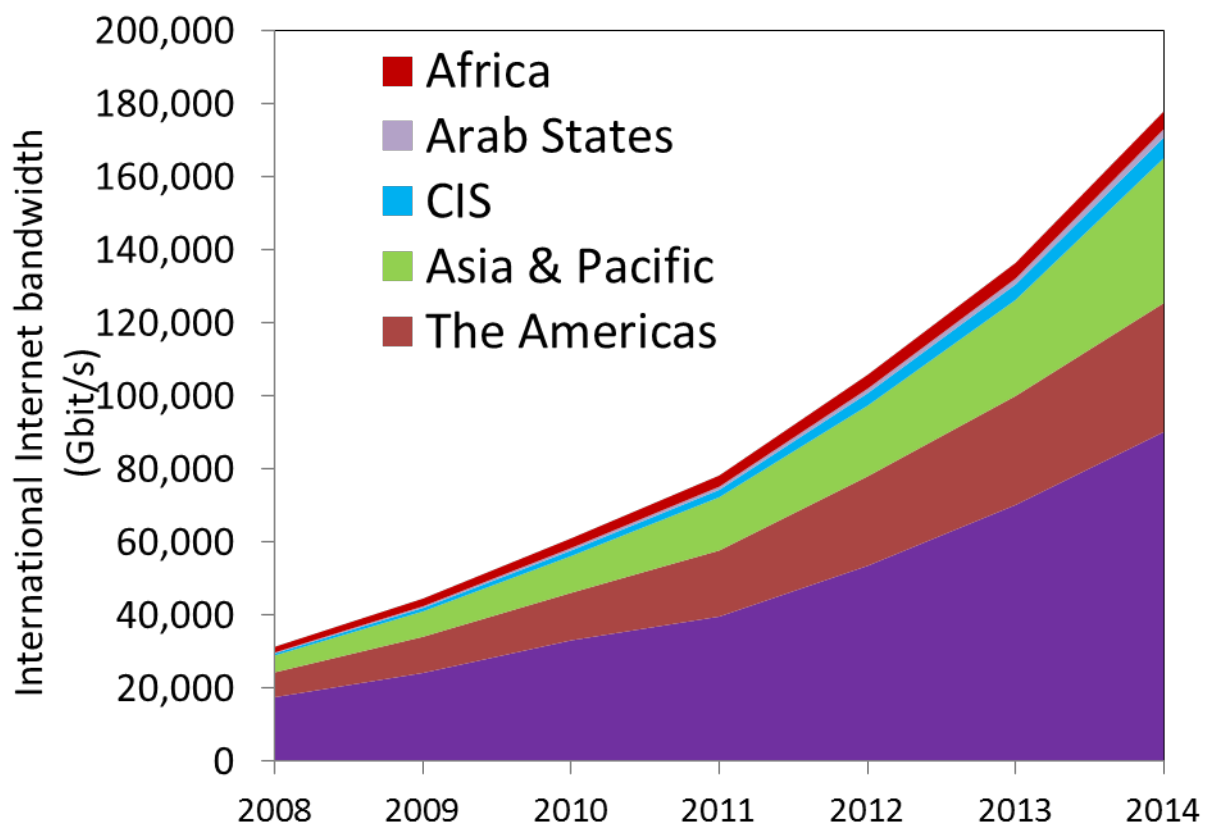


- In 2014, in 111 countries the price of a basic (fixed or mobile) broadband plan corresponds to less than 5% of average GNI per capita, thus meeting the Broadband Commission target
- The global average price of a basic fixed-broadband plan (52 PPP\$) is 1.7 times higher than the average price of a comparable 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: ¹ Either fixed broadband or mobile broadband. ²Based on simple averages including data for 160 economies.

International Internet Broadband : Where are we ?

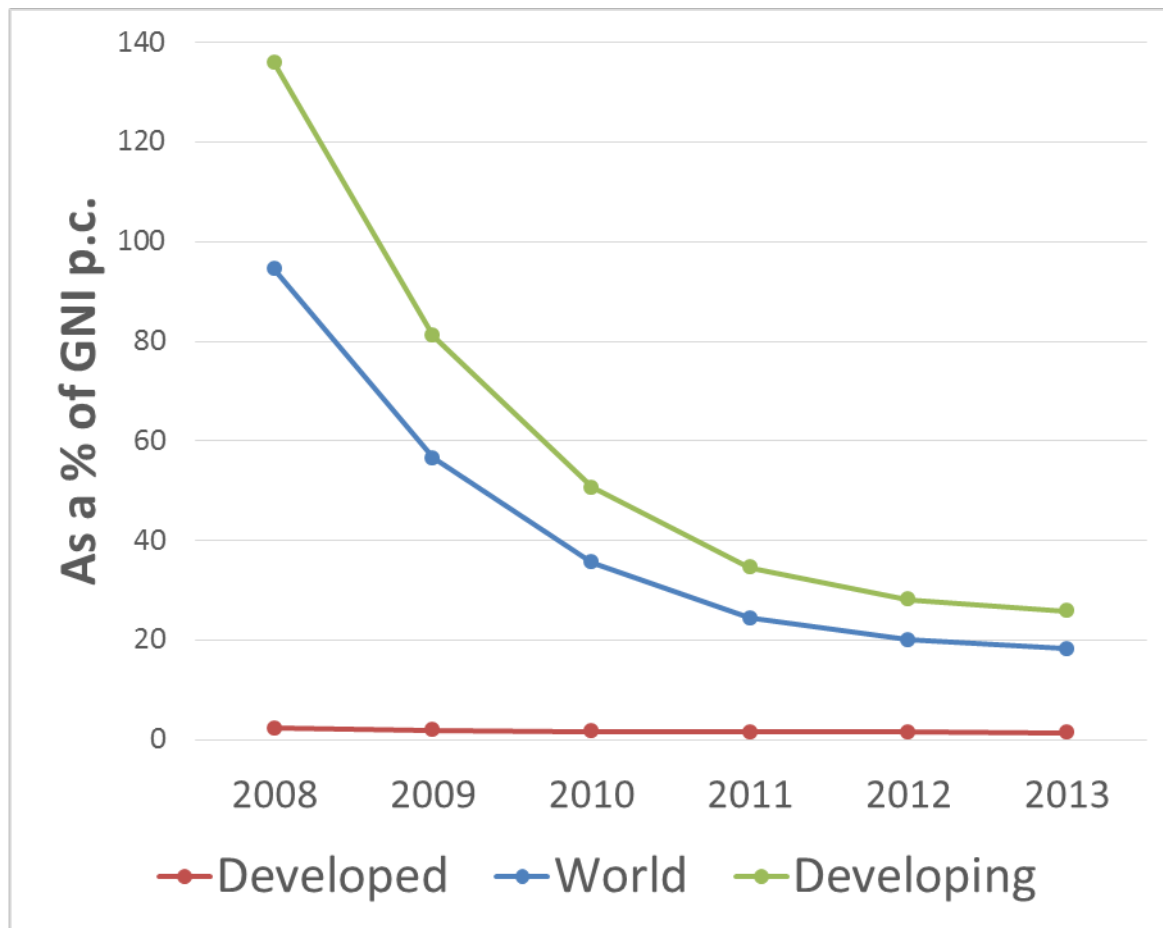
The regional breakdown shows half of total connectivity in Europe in 2014; strong growth in Asia-Pacific region from 2011-2014.



Source: ITU data

International Internet Broadband : Where are we ?

Strong reductions in price of consumer fixed broadband packages

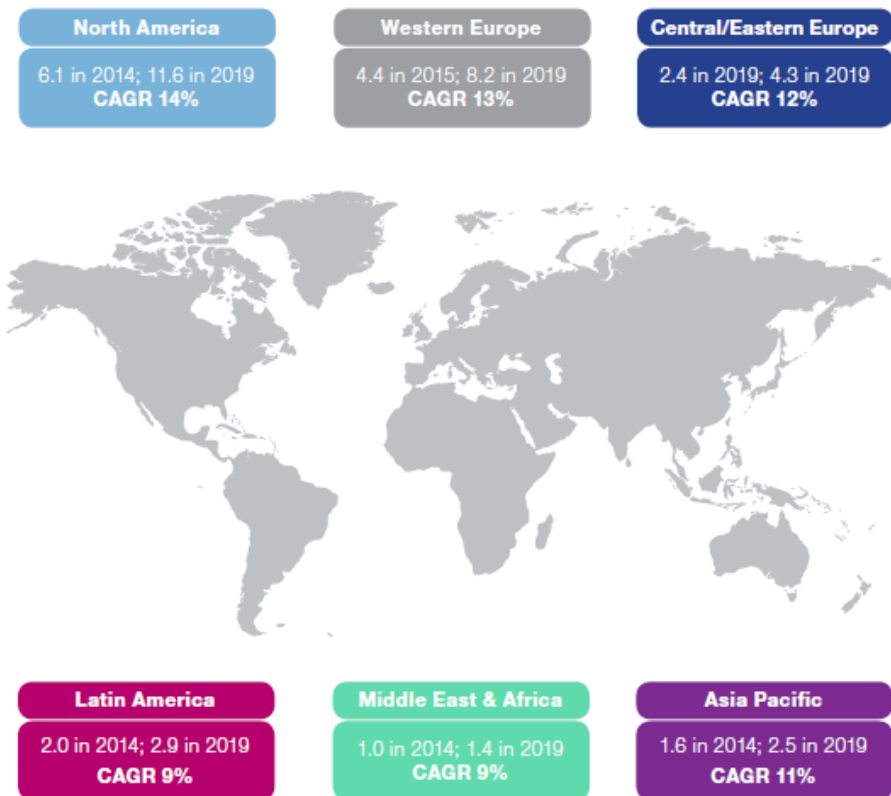


Source: ITU data

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)

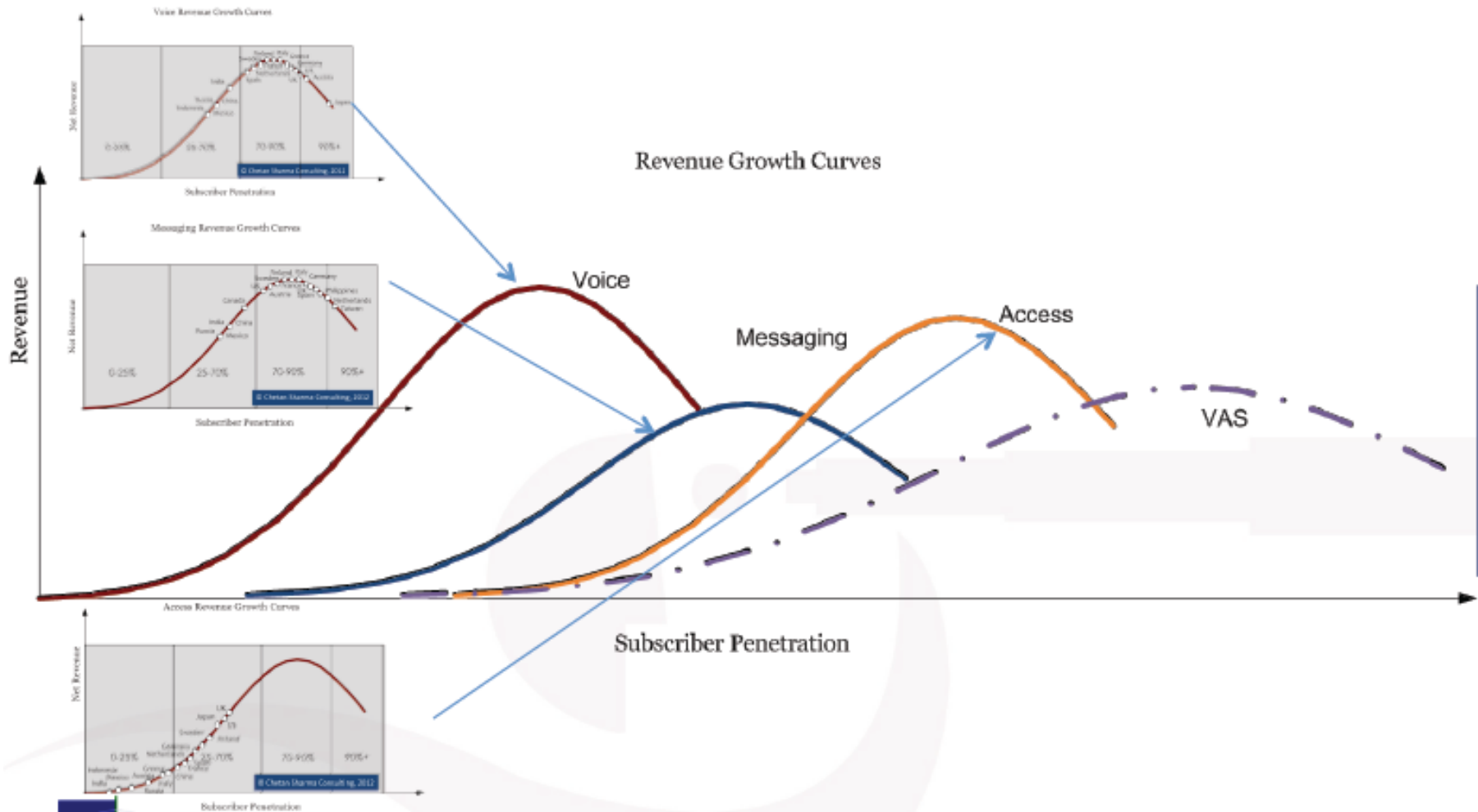


For every new person connecting to the Internet over the next five years, ten times as many devices will connect.

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

2nd some global business trends

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

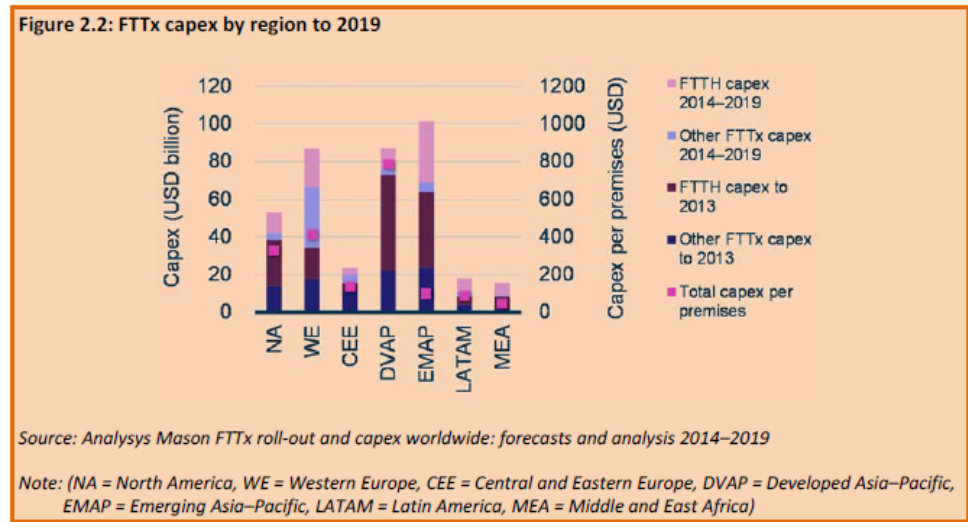
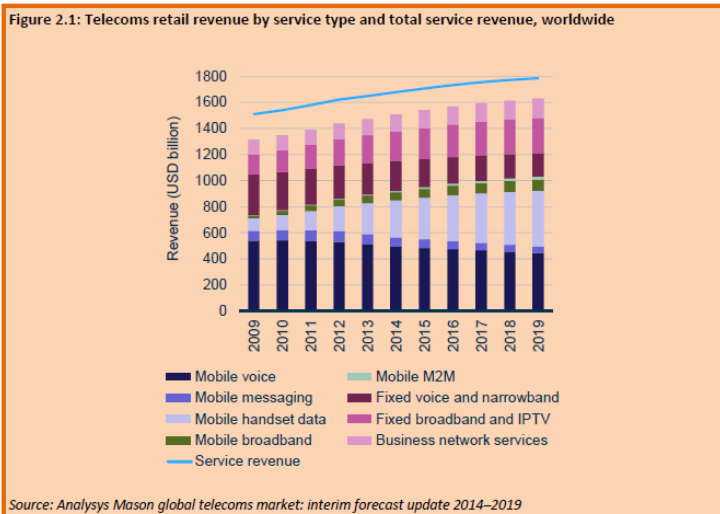


© Chetan Sharma Consulting, 2012

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



Revenue and Investment Trends

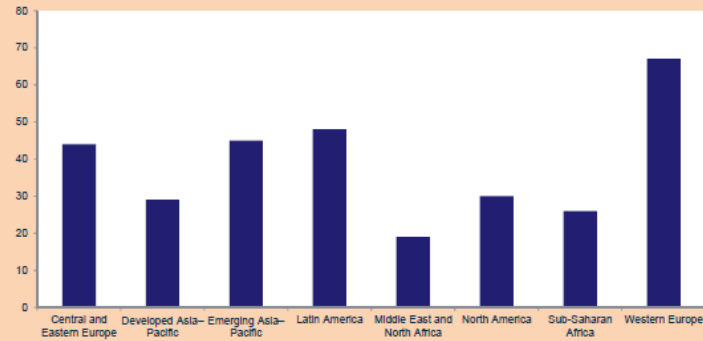


Source: ITU GSR discussion paper Investment strategies for the deployment of broadband and access to the digital economy
 Authors: Iqbal Singh Bedi, Nuno Afonso, Dr Matt Yardley from Analysys Mason

The full paper can be downloaded from <http://www.itu.int/en/ITU-D/Conferences/GSR/Pages/GSR2015/GSR15-discussion-paper.aspx>

Mobile Broadband Network Deployment Trends

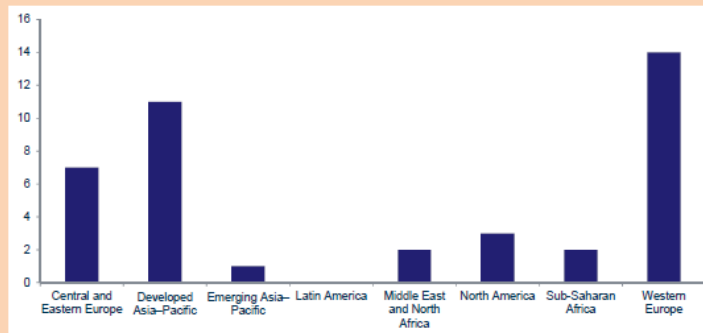
Figure 2.3: The number of operators by region that have launched or are planning LTE deployments



Source: Analysys Mason wireless networks tracker, 2015

308 operators have launched or are planning various LTE deployments worldwide

Figure 2.4: The number of operators by region that have launched or are planning LTE-A deployments



Source: Analysys Mason Wireless networks tracker, 2015

40 operators have launched or are planning various LTE-A deployments worldwide

Source: ITU GSR discussion paper Investment strategies for the deployment of broadband and access to the digital economy Authors: Iqbal Singh Bedi, Nuno Afonso, Dr Matt Yardley from Analysys Mason

Investment approach	Funding source	Deployment and operations of infrastructure	Ownership of infrastructure	Case study
Private DBO	Public and private sectors	Private sector	Private sector	<ul style="list-style-type: none"> • Mobile Infrastructure Project (MIP), UK • National Broadband Scheme (NBS), Ireland
Public outsourcing	Public sector	Private sector	Public sector	<ul style="list-style-type: none"> • National ICT Broadband Backbone (NICTBB), Tanzania • Johannesburg Broadband Network Project (JBNP), South Africa
JV	Public and private sectors	Public and private sectors	Public and private sectors	<ul style="list-style-type: none"> • Metroweb, Italy
Public DBO	Public sector	Public and private sectors	Public sector	<ul style="list-style-type: none"> • Qatar National Broadband Network (QNBN), Qatar

Source: *Analysys Mason, 2015*

Financial innovation	Case study	Executing parties
Crowdfunding	Star Citizen, USA Pebble, USA Shyp, USA	Individuals Individuals Private investors
Pension funding	Hipcom, UK	Business owner
Bitcoin currency	mexBT, Mexico	Seedcoin
Charity or non-profit institutions	Aentropico, Colombia	INNpulsA and Fundación Bavaria

Source: *Analysys Mason, 2015*

Some Financing Trends

Source: ITU GSR discussion paper Investment strategies for the deployment of broadband and access to the digital economy

Authors: Iqbal Singh Bedi, Nuno Afonso, Dr Matt Yardley from *Analysys Mason*

The full paper can be downloaded from <http://www.itu.int/en/ITU-D/Conferences/GSR/Pages/GSR2015/GSR15-discussion-paper.aspx>

3rd some global technology trends

- Copper
- Fibre
- Mobile
- Satellite
- Wi-fi
- Smart City Infrastructure

Access network wireline data transmission standards

Modem	Data rate*	Application	Recommendation
ITU-T V.90	56 kbit/s	Data and Internet access	ITU-T V.90
ISDN BRI	144 kbit/s	2B (2 x 64 kbit/s) + D (16 kbit/s)	ITU-T I.432.x series
HDSL	2,048 kbit/s	1.5 – 2.0 Mbit/s symmetrical service on two-three pairs	ITU-T G.991.1
SHDSL	768 kbit/s	HDSL on a single pair	ITU-T G.991.2
ADSL	6 Mbit/s / 640 kbit/s	Access to Internet and multimedia databases, video distribution	ITU-T G.992.1
ADSL2	8 Mbit/s / 800 kbit/s		ITU-T G.992.3
ADSL2+	16 Mbit/s / 800 kbit/s		ITU-T G.992.5
VDSL	52 Mbit/s / 2.3 Mbit/s	Internet Access + HDTV	ITU-T G.993.1
VDSL2	100 Mbit/s		ITU-T G.993.2
VDSL2 vectoring		Internet Access + HDTV over longer loops with more users	ITU-T G.993.5
* Downstream (network to subscriber) / upstream (subscriber to network). Single values are symmetric. DSL speeds are "up to" the values in the table.			

G.FAST

“G.fast, the new ITU broadband standard designed to deliver access speeds of up to 1Gbit/s over existing telephone wires. The standard answers to service providers’ need for a complement to fibre to the home (FTTH) technologies in scenarios where G.fast proves the more cost-efficient strategy.

G.fast, within the fibre to the distribution point (FTTdp) architecture, combines the best aspects of fibre and DSL.”

With these functionalities and capabilities, the technology specified in **Rec. ITU-T G.9701 (12/2014) – Pre-published version 13** targets the following aggregate net data rates over a 0.5 mm straight wire-pair:

- 500 to 1000 Mbit/s for FTTB deployments shorter than 100 m, straight loops;
- 500 Mbit/s at 100 m; (Values achieved in tests 700 Mbps)
- 200 Mbit/s at 200 m; (Values achieved in tests 500 Mbps)
- 150 Mbit/s at 250 m; (Values achieved 200 Mbps at 400 m)

Summary of ITU FTTx Standards

ITU-T G.982	Optical access networks to support services up to the ISDN primary rate or equivalent bit rates
ITU-T G.983.x	Broadband optical access systems based on Passive optical networks (PON)
ITU-T G.984.x	Gigabit-capable passive optical networks (GPON)
ITU-T G.985	100 Mbit/s point-to-point Ethernet-based optical access system
ITU-T G.986	1 Gbit/s point-to-point Ethernet-based optical access system
ITU-T G.987.x	10-Gigabit-capable passive optical network (XG-PON) systems
ITU-T G.988	ONU management and control interface specification (OMCI)

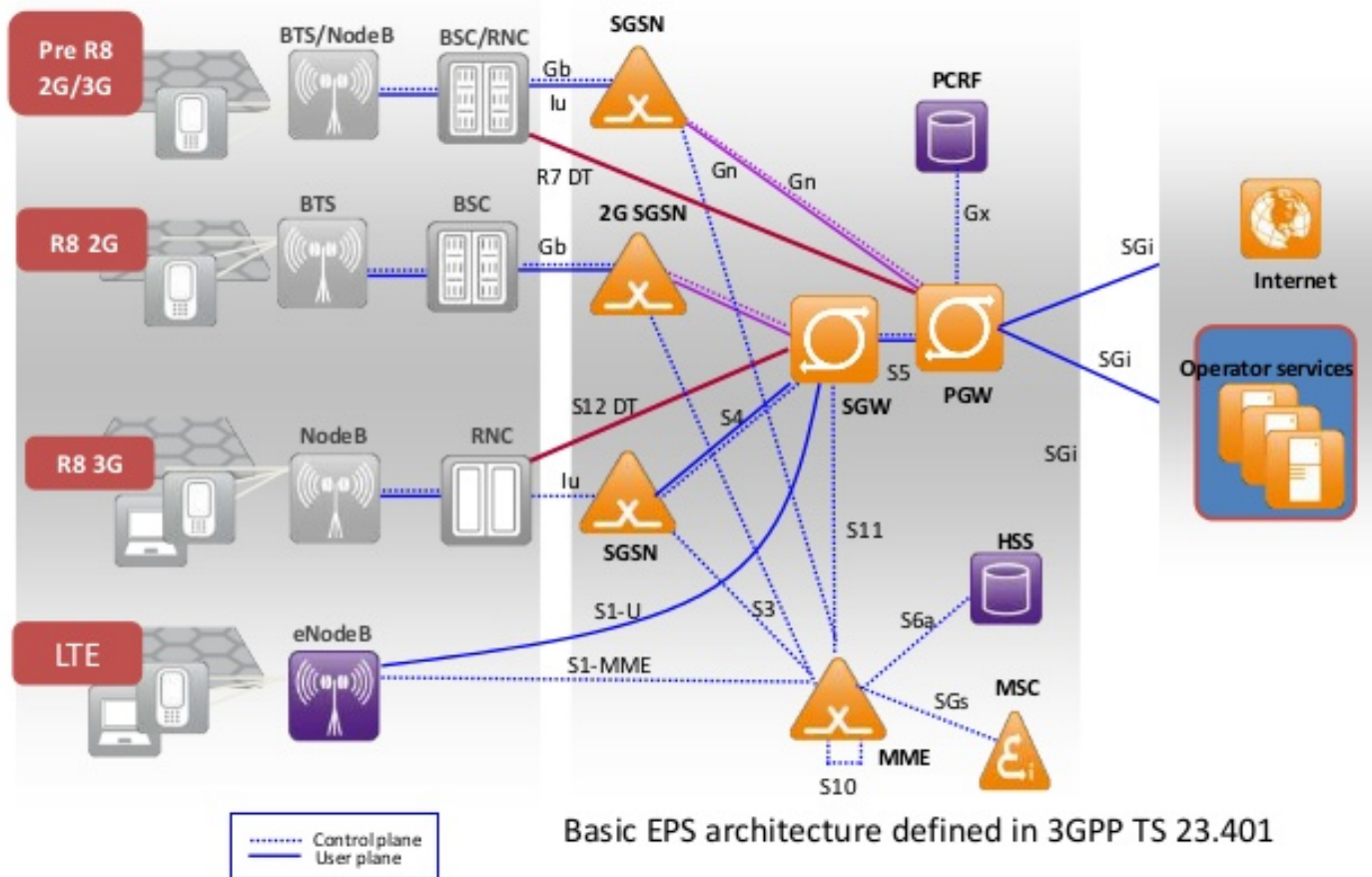
ITU-T G.989 Series NG-PON2 supports 40 Gbps

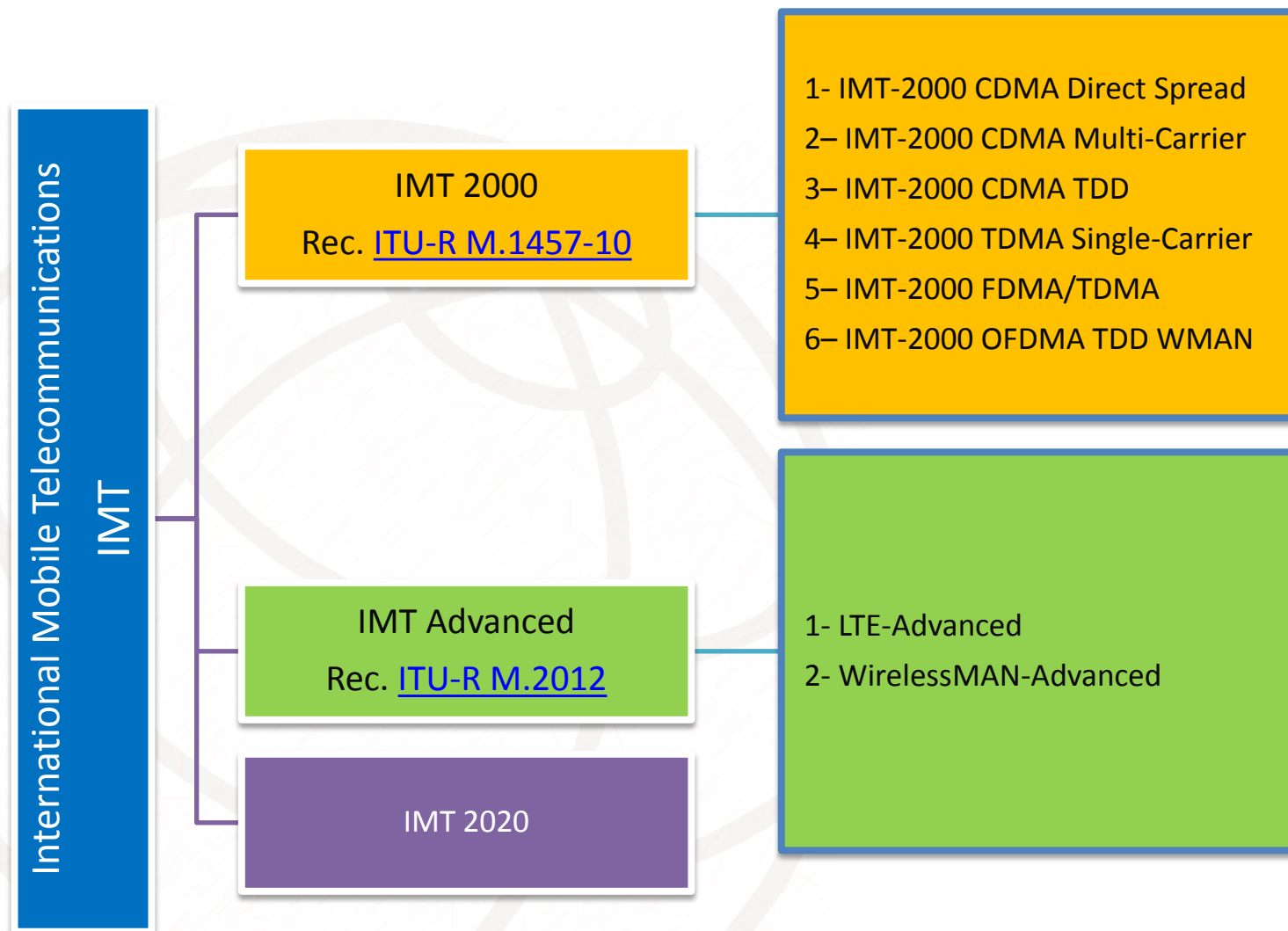
Sources: ITU-D SG QUESTION 25/2: *Access technology for broadband telecommunications including IMT, for developing countries* available at http://www.itu.int/dms_pub/itu-d/opb/stg/D-STG-SG02.25-2014-PDF-E.pdf & ITU

Hybrid Fiber Coax: Cable TV & Modem

- Digital cable TV networks permits the addition of high-bandwidth data transfer to an existing Cable TV system
- Architecture Cable modem in customer premise, Cable Modem Termination System (CMTS) at the network's head-end, the well established HFC standard, DOCSIS 2.0/3.0/3.1.
- It can provides data transmission service with speeds depending upon its version on one 8 MHz channel.
- DOCSIS 3.0 was ratified as ITU-T Recommendation J.222
- Advantage - Relatively high bandwidths can be provided to the end user without distance limitations
- Disadvantage - Shared network architecture limits the amount of bandwidth delivered to customer

General LTE Architecture

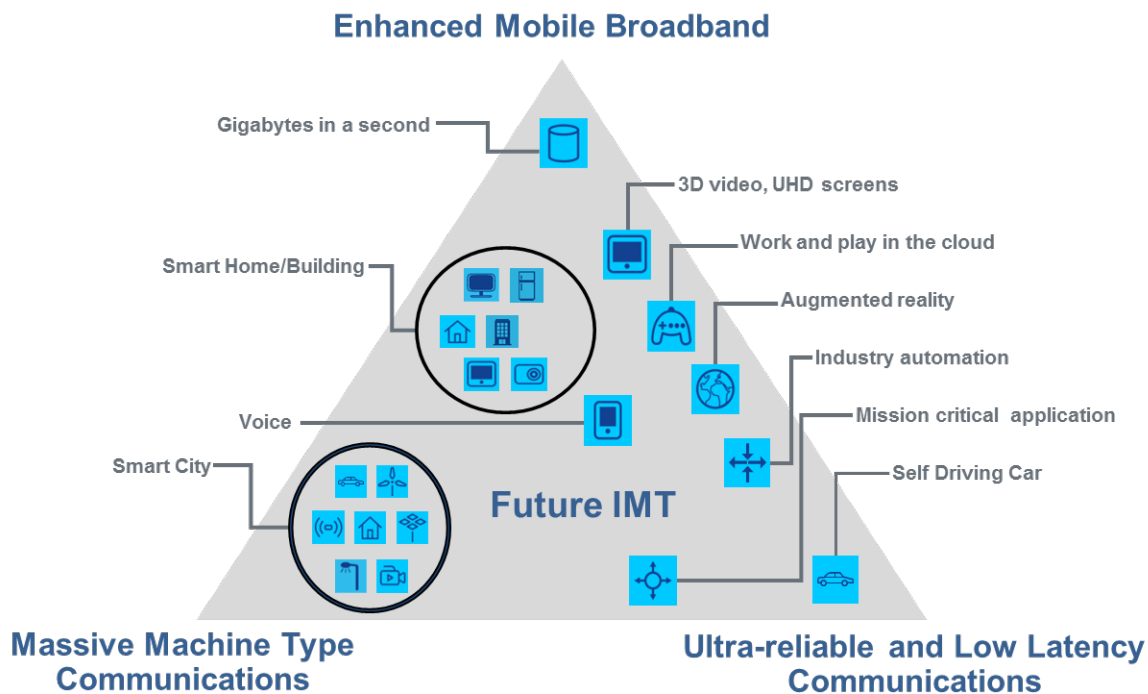




IMT 2000 Vs IMT – Advanced

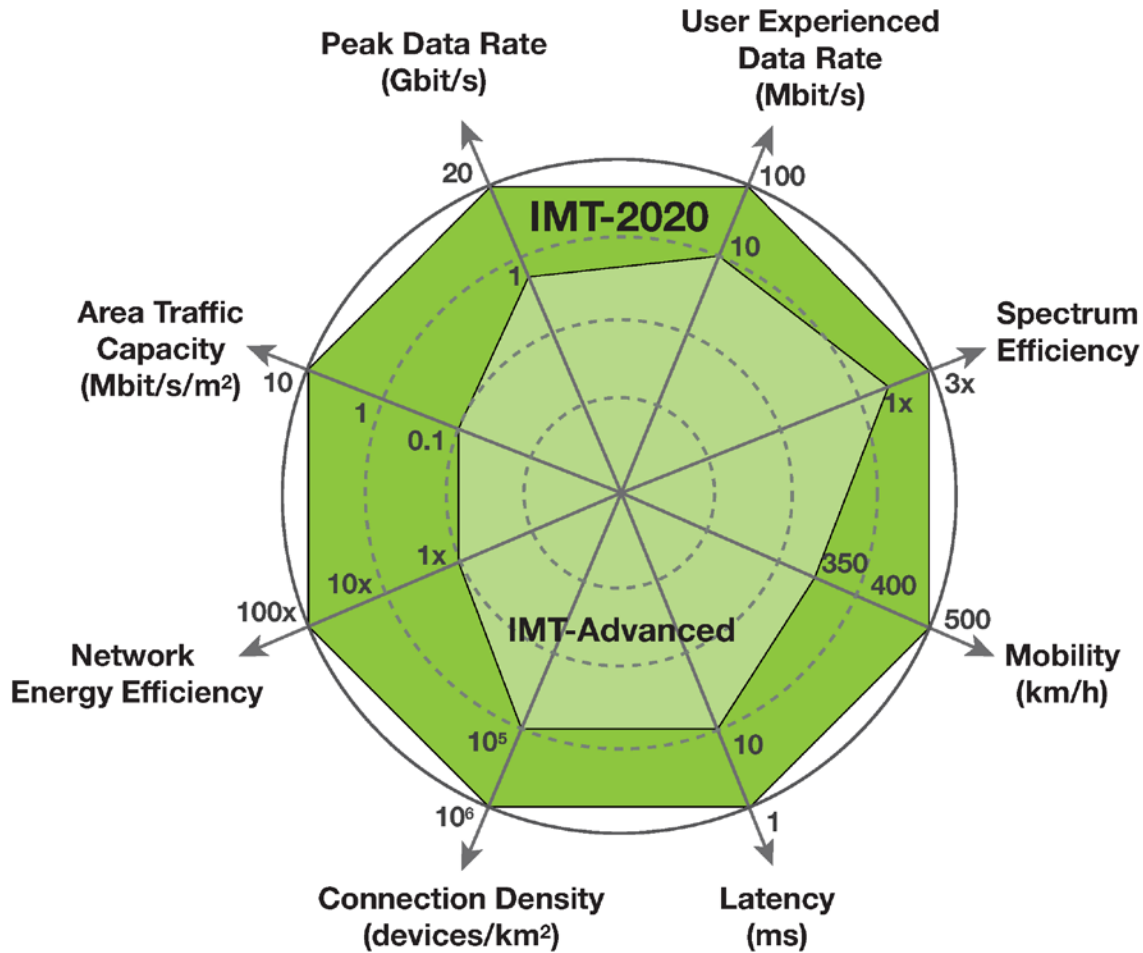
	IMT-2000	IMT-Advanced
ITU-R Recommendation	ITU-R M.1457-10 (06/2011): Detailed specifications of IMT-2000	ITU-R M.2012 (01/2012): Detailed specifications of IMT-Advanced
Main Technical Criteria	<ul style="list-style-type: none"> 1- high degree of commonality of design worldwide; 2- compatibility of services within IMT-2000 and with the fixed networks; 3- high quality; 4- small terminal for worldwide use; 5- worldwide roaming capability; 6- capability for multimedia applications, and a wide range of services and terminals. 	<ul style="list-style-type: none"> 1- a high degree of commonality of functionality worldwide while retaining the flexibility to support a wide range of services and applications in a cost-efficient manner; 2- compatibility of services within IMT and with fixed networks; 3- capability of interworking with other radio access systems; 4- high-quality mobile services; 5- user equipment suitable for worldwide use; 6- user-friendly applications, services and equipment; 7- worldwide roaming capability; 8- enhanced peak data rates to support advanced services and applications (100 Mbit/s for high and 1 Gbit/s for low mobility were established as targets for research; (rates sourced from ITU-R M.1645)

Usage Scenarios for IMT 2020



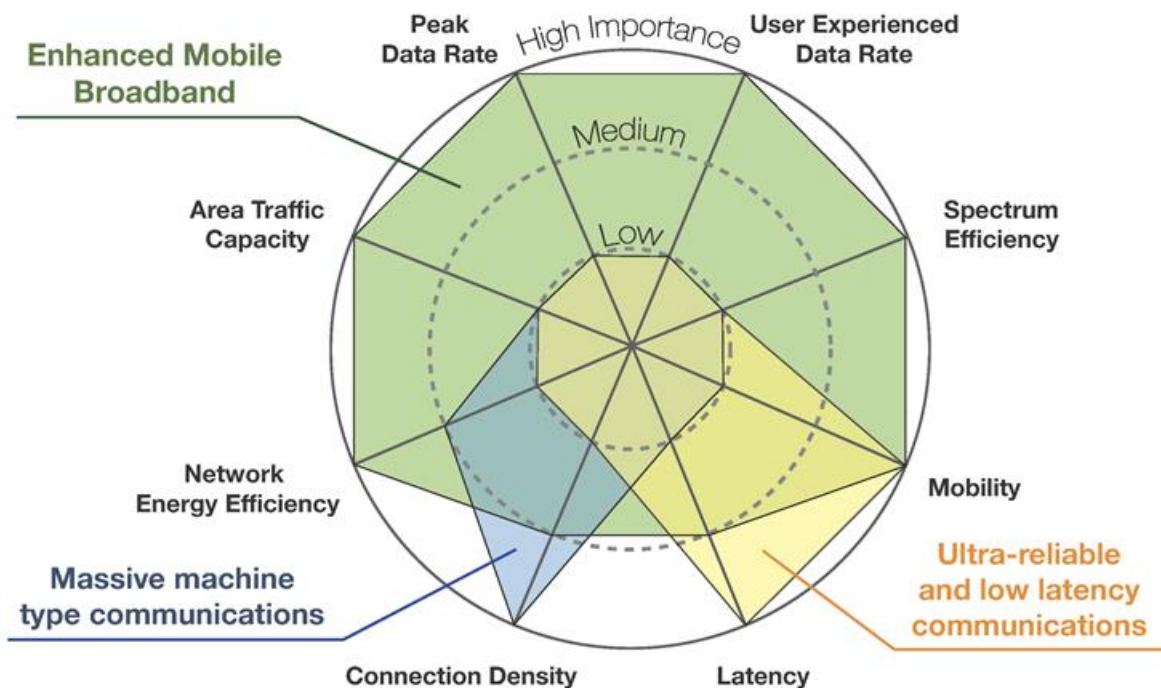
ITU-R Recommendation M.2083-0 (09/2015)

Enhancement of key capabilities from IMT-Advanced to IMT-2020



ITU-R Recommendation M.2083-0 (09/2015)

The importance of key capabilities in different usage scenarios



ITU-R Recommendation M.2083-0 (09/2015)

Advances in Satellite Broadband Technologies

Timeline	2005	2010	2015	2020
Generation	Ku-band satellites	First generation multi beam Ka-band satellites	Second generation multi beam Ka-band satellites	Third generation multi beam Ka-band satellites
Service capability	Internet broadband	High speed Internet broadband	Superfast Internet broadband	Very high speed Internet broadband
Maximum service rate	2-3 Mbps	10-2 Mbps	30-50 Mbps	100 Mbps
Capacity per satellite	5	50-100	150-200	>500
Users per satellite	100.000	Several 100.000s	Up to 1 million	>1 million

Source: ISI European Technology Platform.

Smart Sustainable City (SSC)

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

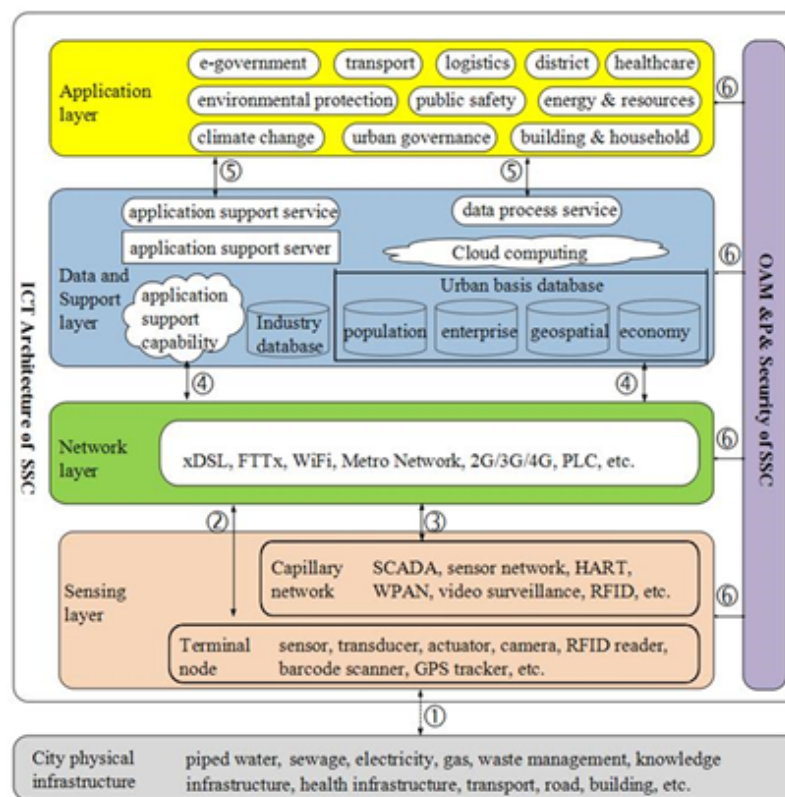
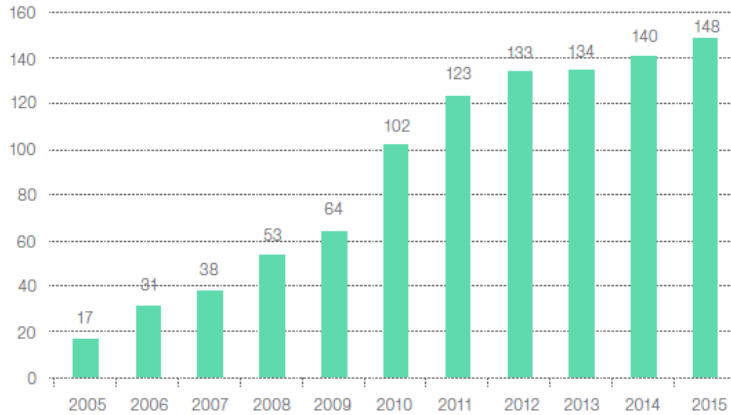


Figure source: ITU-T Focus Group on Smart Sustainable Cities: *Overview of smart sustainable cities infrastructure*

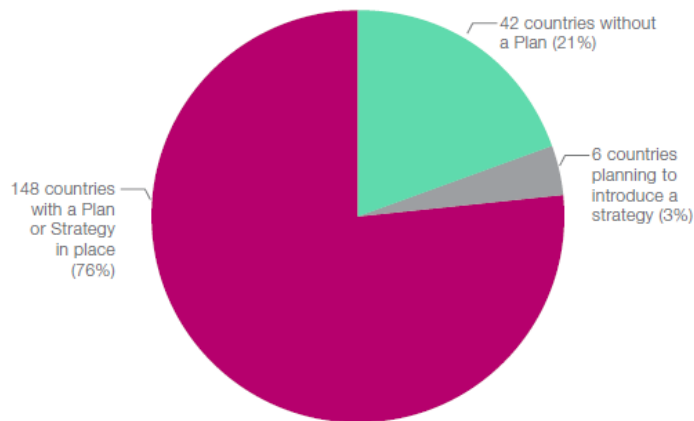
4th some global policy & regulatory trends

Number of Countries with National Broadband Plans, 2005-2015



Broadband plans 2005-2015

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

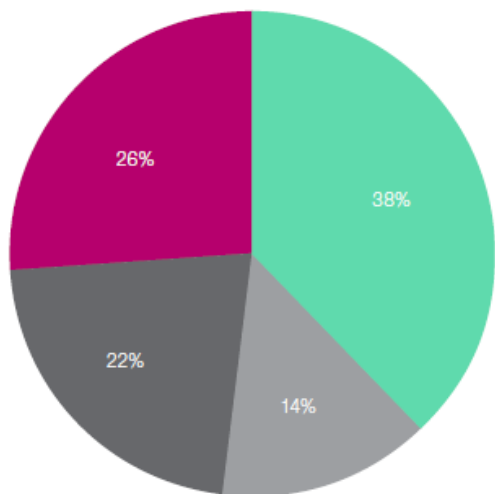


Phase	1) Deployment	2) Adoption	3) Integration
Focus	Broadband network availability	Broadband access & capacity building for effective use	Broadband integration in economy and society
Examples	Optical fibre cable and wireless broadband access networks	Digital literacy programmes; community access projects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

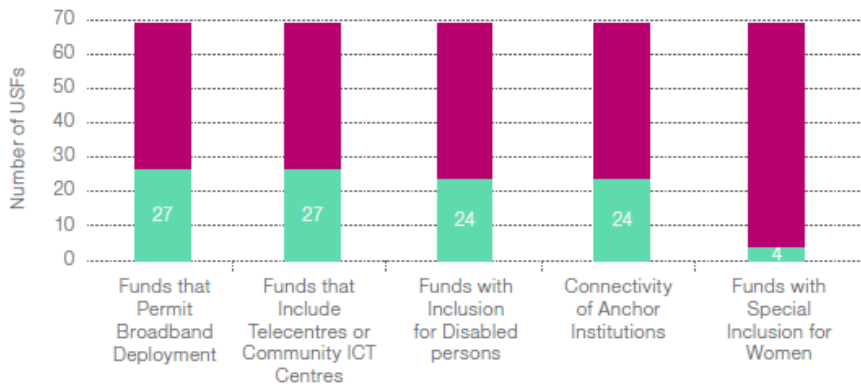
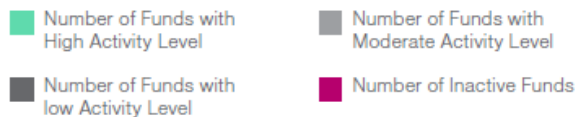
National Broadband Policy: Experiences from ITU

- 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



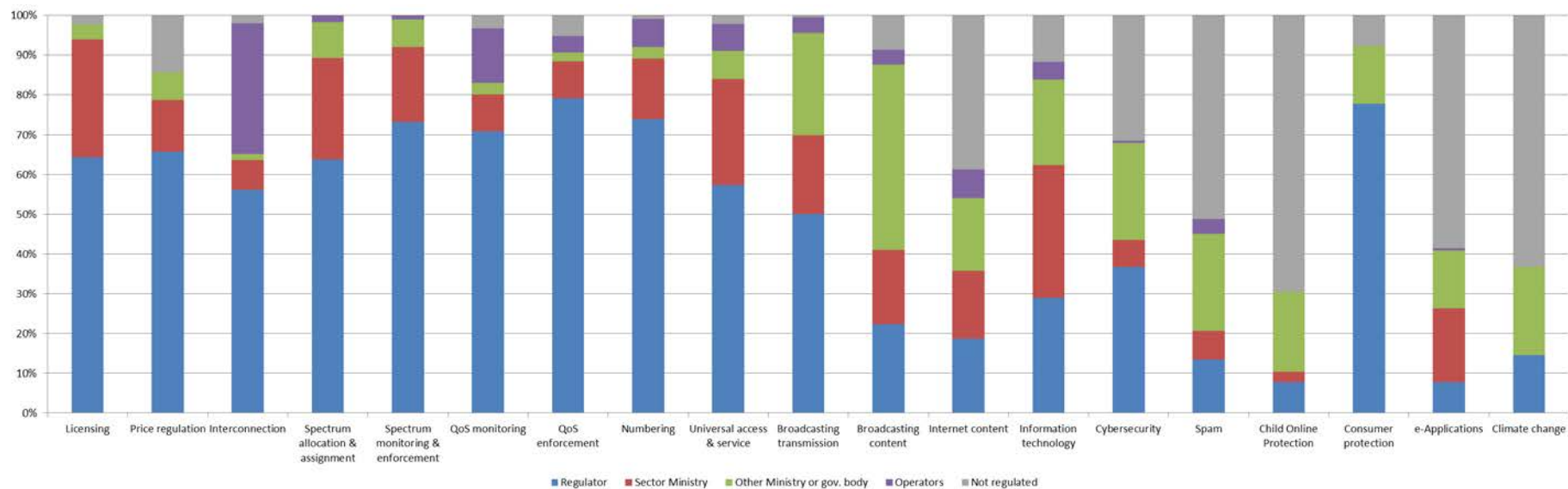
Source: "Universal Service Funds and Digital Inclusion for All", ITU (2013), available at: www.itu.int/en/ITU-D/Regulatory-Market/Documents/USF_final-en.pdf.



Which Regulations Shaped the ICT Sector from 2006 to 2013?

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

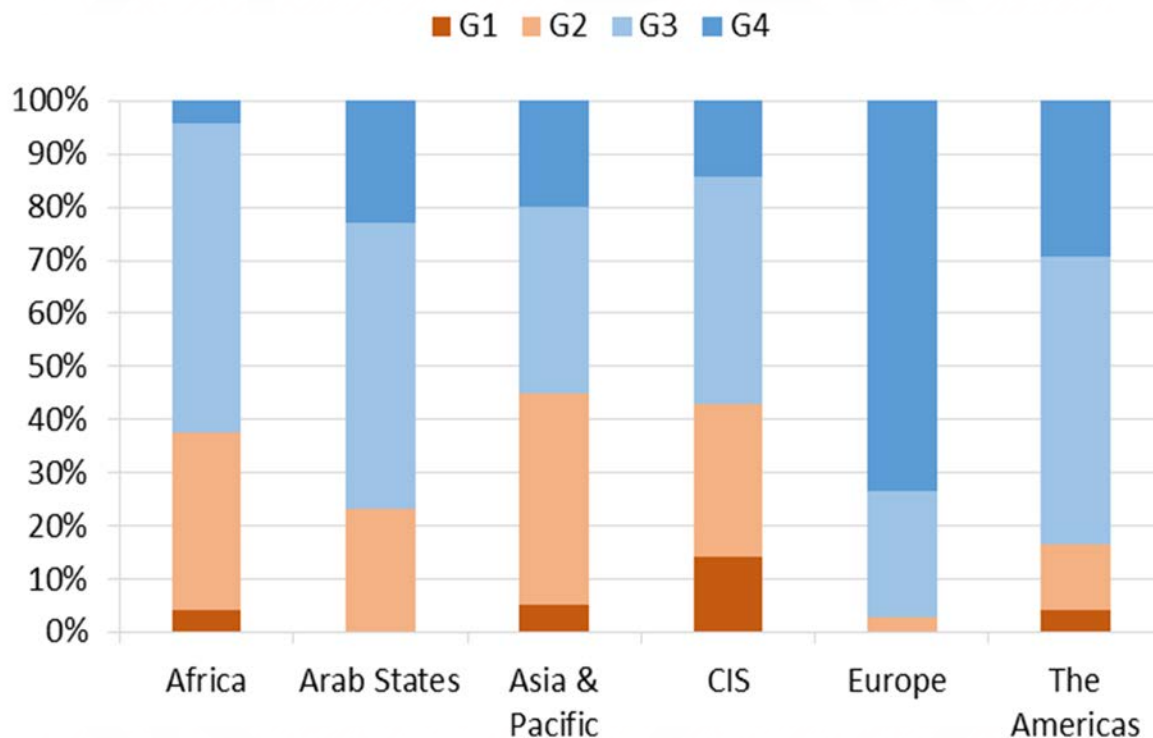
Regulatory Mandate, 2013



Source: ITU World Telecommunication Regulatory Database

Beginning of 2014

Maturity of Regulation



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

Source: ITU.

Where are we heading to?

ITU Plenipotentiary Conference 2014

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

55%

of households should have access to the Internet

60%

of individuals should be using the Internet

40%

Telecommunications/ICTs 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



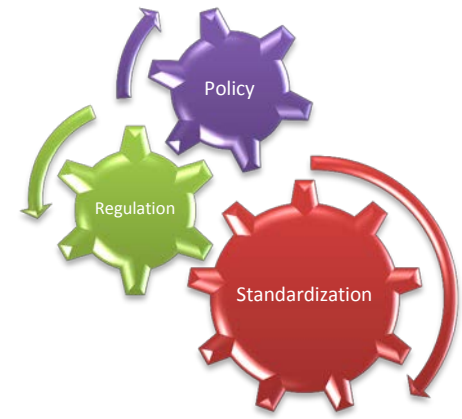
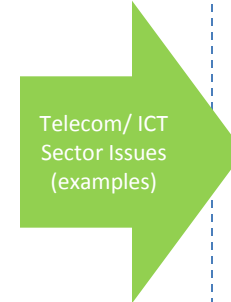
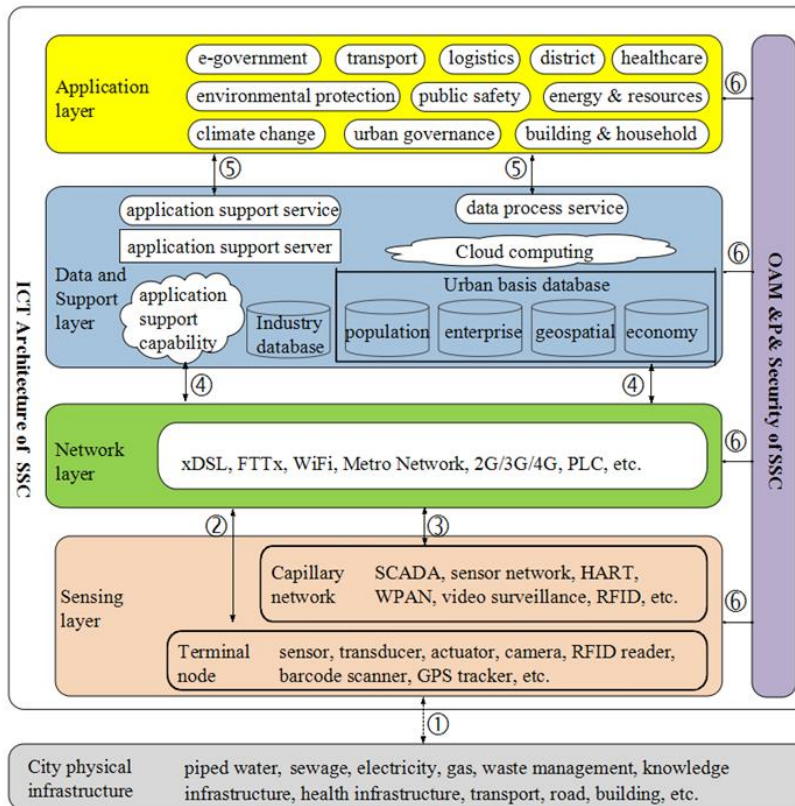
INNOVATION

Definition of Smart Sustainable Cities

“A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects”.

- ITU-T Focus Group on Smart Sustainable Cities (FG-SSC)

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



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	Infrastructure Sharing
Green ICTs	
Data Centres	e-Waste
Emergency Telecommunications	

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

Different Services, Different Requirements - Examples

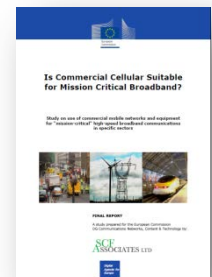
PPDR services

- **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)

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

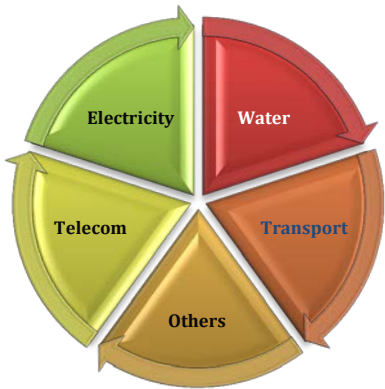
	Total spectrum requirements for RATG 1	Total spectrum requirements for RATG 2	Total spectrum requirements RATGs 1 and 2
Lower user density settings	440 MHz	900 MHz	1 340 MHz
Higher user density settings	540 MHz	1 420 MHz	1 960 MHz

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



SMART
SUSTAINABLE
CITIES

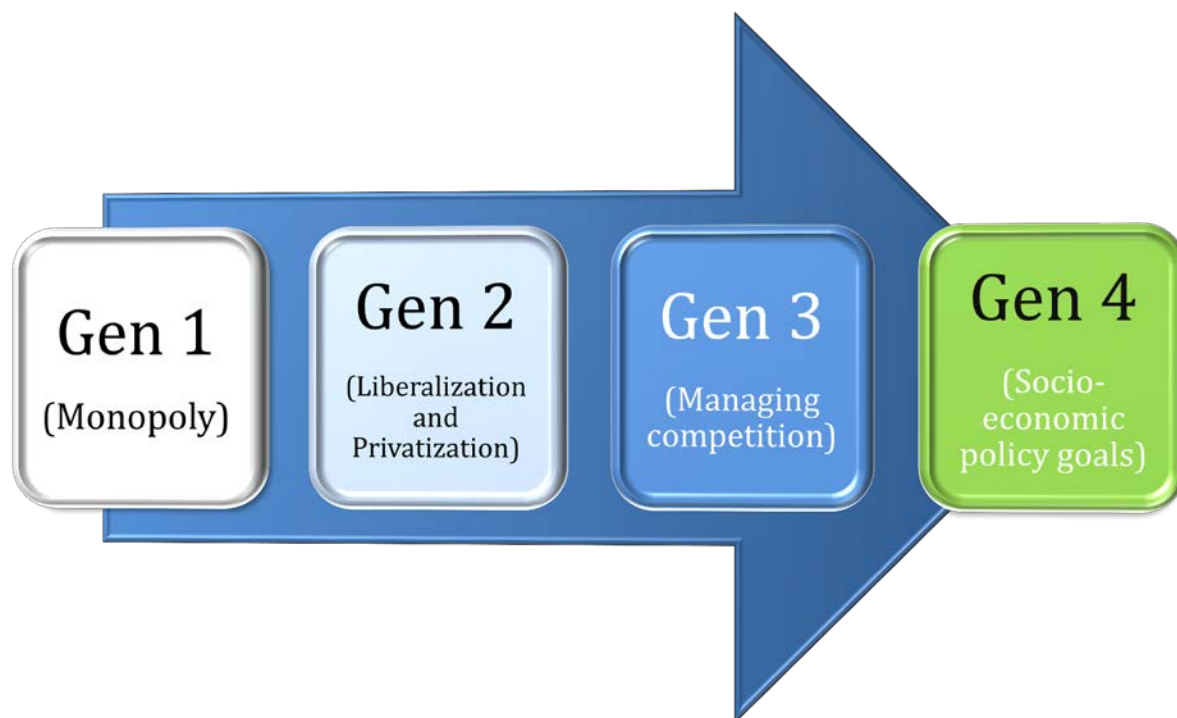
REGULATORY COLLABORATION



MULTI UTILITY
REGULATOR



Regulation 4.0 - GSR 13 Best Practices

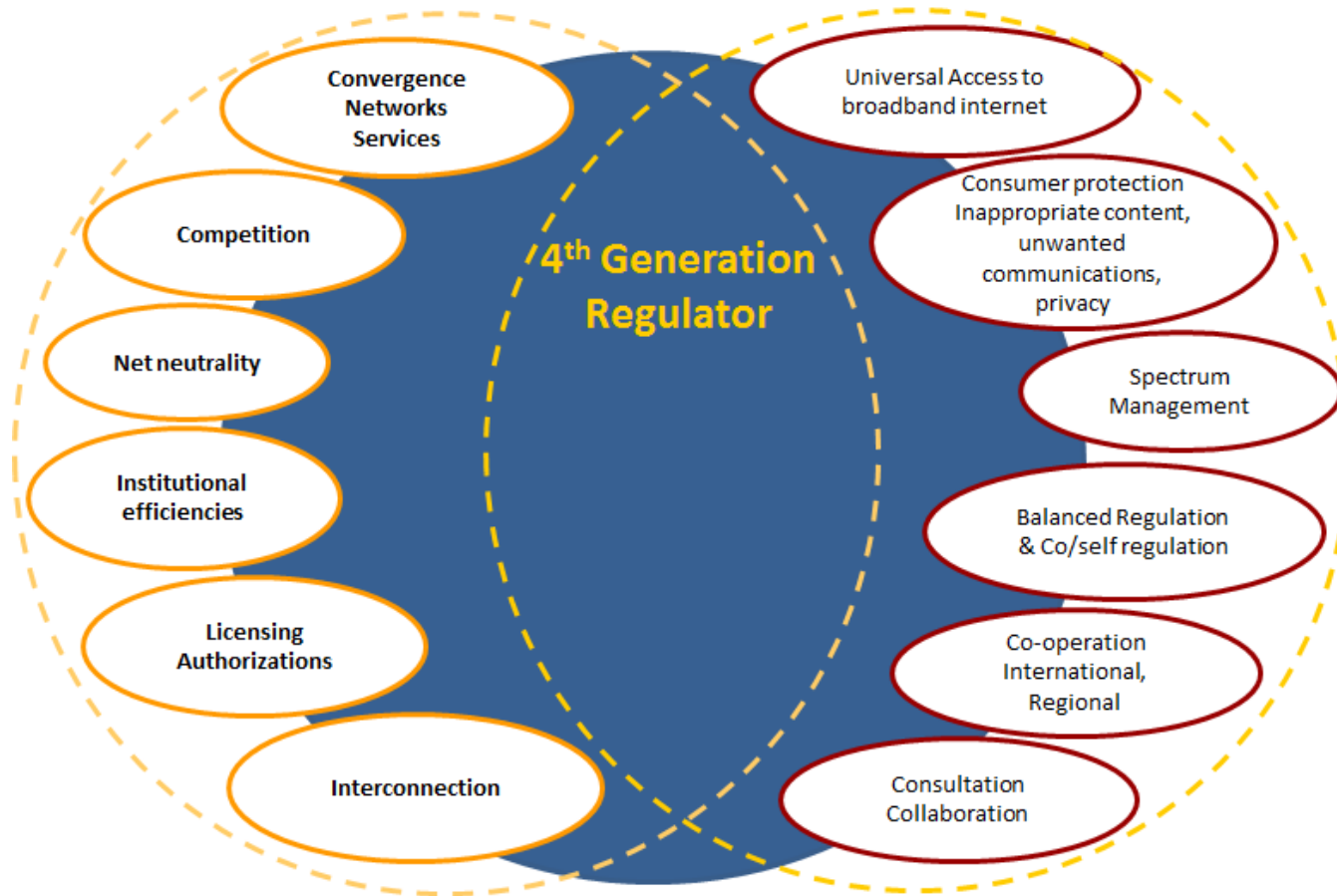


1 Innovative and smart regulatory approaches fostering equal treatment of market players without putting extra burden on operators and service providers

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

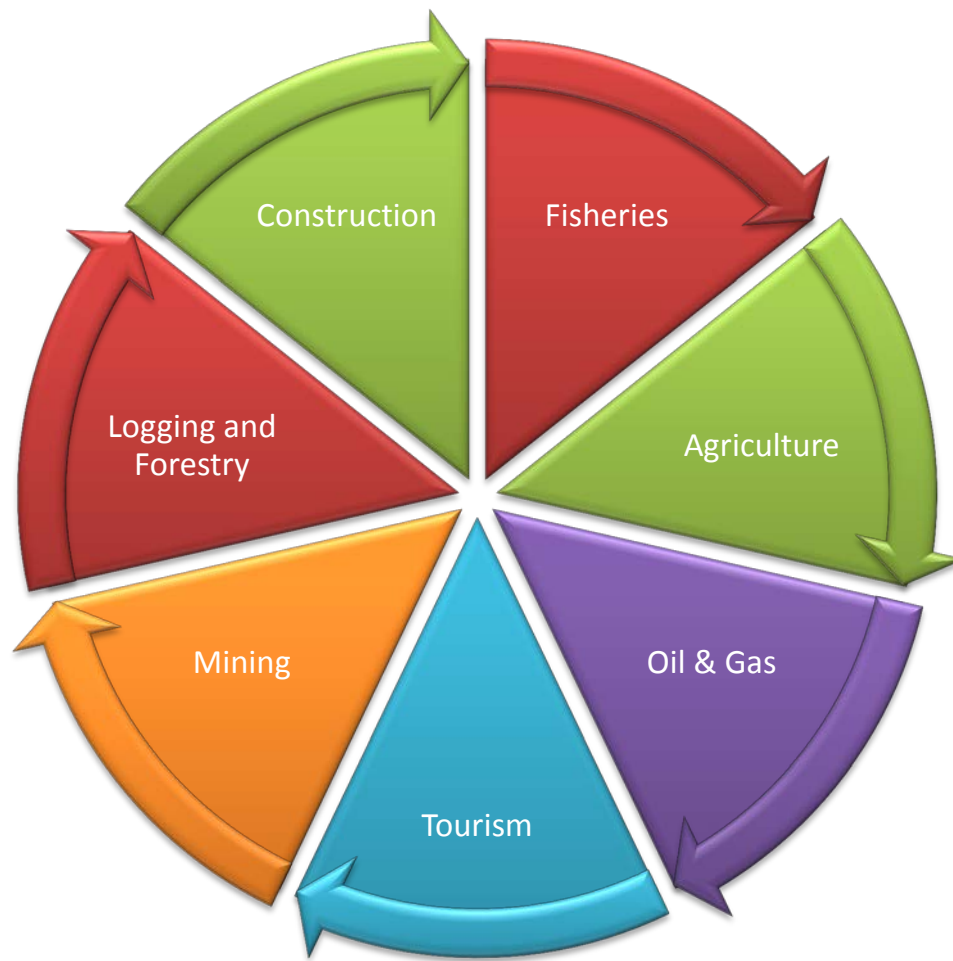
3 The need to adapt the structure and institutional design of the regulator to develop future regulation

Regulation 4.0



THE PACIFIC CONTEXT

Pacific: Key Economic Activities



RECAP

REVIEW OF THE 2010 FAIDP
SECRETARIAT CROP ICT WG
USP

ICT policy, legislation and regulatory frameworks

	National ICT Policies	Cybercrime Legislation	Regional Strategy to combat cybercrime	Electronic files admissible in court	Data protection legislation	ICT Education Policy	ICT Health Policy
Cook Islands	Y	N	N/A	N/A	N	Y	Y
Fiji	Y	Y	N/A	N/A	N	Y	Y
FSM	Y	N	N/A	N/A	N	Y	N/A
Kiribati	Y	N	N/A	N	N	N	N
Marshall	Y	N	Y	N	N	Y	N
Nauru	N	N	N/A	N/A	N	Y	N/A
New Caledonia	Y	N	N	N	N	Y	Y
Niue	N	N	N/A	N/A	N	N	N
Palau	Y	N	N/A	Y	N	Y	Y
PNG	Y	N	N/A	N/A	N	Y	N/A
Samoa	Y	Y	N/A	N/A	N	Y	N/A
Solomon	N	N	N/A	N	N	N	N
Tonga	Y	Y	N/A	Y	Y	Y	N/A
Tuvalu	N	N	N/A	N	N	N	N
Vanuatu	Y	Y	N/A	N/A	N	Y	N/A

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

ICT Human Capacity Building

	Secondary schools have access to Computers	Secondary schools have Internet access	ICT curriculum included in Teacher Training
Cook Islands	Y	Y	Y
Fiji	Y	Y	Y
FSM	Y	Y	N
Kiribati	Y	Y	N
Marshall	Y	Y	N
Nauru	Y	Y	N
New Caledonia	Y	Y	Y
Niue	Y	Y	N
Palau	Y	Y	N
PNG	Y	Y	N/A
Samoa	Y	Y	N/A
Solomon	Y	Y	N
Tonga	Y	Y	N/A
Tuvalu	Y	Y	N
Vanuatu	Y	Y	N

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/June-Pacific-Ministerial-Meeting/home.aspx>

ICT Infrastructure and Access

	Broadband Rollout Plans	e-Environment Programme	PICT Providers have contingency and continuity plans	Early warning and disaster management system	Public Key Infrastructure Establishment	Regional Collaboration with Energy Sector
Cook Islands	Y	Y	Y	Y	Y	Y
Fiji	Y	Y	Y	Y	N	N/A
FSM	Y	N/A	Y	N/A	N	N/A
Kiribati	Y	Y	Y	N	N	N
Marshall	Y	Y	Y	N	N	Y
Nauru	Y	N	Y	N	N	N/A
N.C	Y	N	Y	Y	N	N
Niue	Y	N	Y	N	N	N
Palau	Y	N/A	Y	N/A	N	N/A
PNG	Y	N	Y	Y	N	N/A
Samoa	Y	Y	Y	Y	N	N/A
Solomon	Y	N/A	Y	Y	N	N/A
Tonga	Y	N/A	Y	Y	N	N/A
Tuvalu	Y	N	Y	N	N	Y
Vanuatu	Y	N/A	Y	Y	N	N/A

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

ICT Infrastructure and Access

	Connectivity option	
	International	domestic
American Samoa	●●	●
Cooks Islands	●	●
Federated States of Micronesia	●	●
Fiji	●●	●
French Polynesia	●●	●●
Kiribati	●	●
Marshall islands	●	●
Nauru	●	-
New Caledonia	●	●
Niue	●	-
Norfolk Island	●	-
Palau	●	●●
Papua New Guinea	●●	●
Samoa	●●	●
Solomon islands	●	●
Tokelau	●	●
Tonga	●	●
Tuvalu	●	●
Vanuatu	●	●
Wallis & Futuna	●	●

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

E-WASTE: Participating Countries on the PacWaste programme

	HEALTHCARE WASTE	E-WASTE	ASBESTOS	ATOLL WASTE MANAGEMENT
Cook Islands	✓	✓	✓	
Federated States of Micronesia	✓		✓	
Fiji	✓	✓	✓	
Kiribati	✓	✓	✓	
Marshall Islands	✓	✓	✓	✓ Majuro
Nauru	✓		✓	
Niue	✓		✓	
Palau	✓	✓	✓	
Papua New Guinea	✓			
Samoa	✓	✓	✓	
Solomon Islands	✓	✓	✓	
Timor-Leste	✓			
Tonga	✓	✓	✓	
Tuvalu	✓		✓	
Vanuatu	✓	✓	✓	

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/June-Pacific-Ministerial-Meeting/home.aspx>

Theme 5 – International Connectivity

	IPv6 Transition Plan	Collaborative Regional Project Implementation	A mechanism established to monitor bandwidth, internet connectivity, phone charges
Cook Islands	Y	Y	Y
Fiji	Y	Y	Y
FSM	Y	Y	Y
Kiribati	Y	Y	Y
Marshall	Y	Y	Y
Nauru	N	Y	Y
New Caledonia	Y	Y	Y
Niue	N	Y	Y
Palau	N	Y	Y
PNG	N	Y	Y
Samoa	Y	Y	Y
Solomon	N	Y	Y
Tonga	Y	Y	Y
Tuvalu	N	Y	Y
Vanuatu	Y	Y	Y

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/June-Pacific-Ministerial-Meeting/home.aspx> 60

Theme 6 – Cyber Security and ICT Applications

	National CERT Established	Cyber Safety and Security Awareness
Cook Islands	N	Y
Fiji	Planning	Y
FSM	N	Y
Kiribati	N	Y
Marshall	N	Y
Nauru	N	Y
New Caledonia	N	Y
Niue	N	Y
Palau	N	Y
PNG	N	Y
Samoa	Planning	Y
Solomon	N	Y
Tonga	Planning	Y
Tuvalu	N	Y
Vanuatu	Planning	Y

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/June-Pacific-Ministerial-Meeting/home.aspx>

Theme 6 – Cyber Security and ICT Applications

Countries	e-Government Plans	Ministries have websites/Portal	e-Services Established	Programmes established digitalize historical records	Programme established capture traditional knowledge
Cook	N	Y	Y	N/A	Y
Fiji	Y	Y	Y	Y	Y
FSM	N	Y	N/A	N/A	N/A
Kiribati	N	Y	Y	N	N
Marshall	N	Y	Y	Y	Y
Nauru	N	Y	N	N	N
New Caledonia	Y	Y	Y	Y	Y
Niue	N	Y	N	Y	Y
Palau	N	Y	N/A	N/A	N/A
PNG	Y	Y	Y	Y	N/A
Samoa	Y	Y	Y	Y	N/A
Solomon	N	Y	N	N	N
Tonga	N	Y	Y	N/A	Y
Tuvalu	N	Y	N	N	N
Vanuatu	Y	Y	Y	Y	Y

Source: REVIEW OF THE 2010 FAIDP, SECRETARIAT CROP ICT WG, USP

<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/June-Pacific-Ministerial-Meeting/home.aspx>



Initiative #1

Special Consideration For LDCs*, SIDSs, Including Pacific Island Countries, And Landlocked Developing Countries**

Initiative #2

Emergency Telecommunications

Initiative #3

Harnessing The Benefits Of New Technologies

Initiative #4

Development Of Broadband Access And Adoption Of Broadband

Initiative #5

Policy And Regulation

* LDC: Least Developed Countries

** SIDS: Small Island Developing States

Initiative #1**Special Consideration For LDCs*, SIDSs**, Including Pacific Island Countries, And Landlocked Developing Countries**

Objective: To provide special assistance to least developed countries (LDCs), small island developing states (SIDS), including Pacific island countries, and landlocked developing countries (LLDCs) in order to meet their priority ICT requirements.

Expected results

- 1) Improved infrastructure and enhanced access to affordable ICT services
- 2) Improved enabling environment to facilitate ICT development
- 3) Appropriate national, subregional and regional frameworks for cybersecurity
- 4) Enhanced skills of relevant human resources
- 5) Addressing specific issues and challenges in the Pacific island countries

* LDC: Least Developed Countries

** SIDS: Small Island Developing States



ITU-EC-ACP Project on Harmonization of ICT policies in the ACP Countries

ICB4PAC (Pacific)

Key Performance Indicator (KPI) - In-Country Technical Assistance

	Planned	Ongoing	Validated	Adopted (National Transposition)	Completion Level (in %)
Overall					100
1. Cook Islands					100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
2. Fiji					100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
Licensing Public Consultation Report	✓	✓	✓	✓	100
3. Kiribati					100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
4. Marshall Islands					100
National ICT Policy	✓	✓	✓	✓	100
Licensing	✓	✓	✓	✓	100
5. Micronesia					100
Licensing	✓	✓	✓	✓	100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
Universal Service and Access	✓	✓	✓	✓	100
6. Nauru					100
National ICT Policy	✓	✓	✓	✓	100
Licensing	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
7. Niue					100
National ICT Policy	✓	✓	✓	✓	100
Licensing	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
8. Palau					100
National ICT Policy	✓	✓	✓	✓	100
Licensing	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
9. Samoa					100
National ICT Policy	✓	✓	✓	✓	100
10. Solomon Islands					100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
11. Tonga					100
National ICT Policy	✓	✓	✓	✓	100
Licensing	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
12. Tuvalu					100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100
Licensing	✓	✓	✓	✓	100
Universal Service and Access	✓	✓	✓	✓	100
13. Vanuatu					100
National ICT Policy	✓	✓	✓	✓	100
Cybercrime	✓	✓	✓	✓	100

ITU AND THE PACIFIC

ITU-EC PROJECT (ICB4PAC)

Focus Areas

Numbering
National ICT Policy
International Mobile Roaming
Cybercrime
Licensing
Universal Access and Service
Interconnection and Cost Modeling

Knowledge Based Reports
In-country Technical Assistance
Awareness Raising and Capacity Building

Please visit: <http://www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/Pages/default.aspx>

ITU PROJECT

Development of satellite communications and Emergency communication for the Pacific

PARTNERS

SIDS: 11
MEMBER STATES
IN PACIFIC



Deliverables

- Remote connectivity
- Emergency communications
- E-services and applications
- Human capacity building



Pacific ICT Ministerial

- Pacific ICT Ministerial (2015)

Broadband

- Policy assistance to Fiji, PNG, RMI, Vanuatu
- Capacity building

Broadcasting

- Analog to Digital Transition (Fiji, FSM, Kiribati, Nauru, PNG, Samoa, Solomon Is., Tonga, Vanuatu)
- Capacity building

Spectrum

- Spectrum Master plan for Fiji
- Capacity building

Cybersecurity

- Child online protection (Vanuatu)
- Number Hijacking

Emergency Telecommunication

- Tonga



AN ECOSYSTEM BEYOND TRADITIONAL ICT..



Emergency



Education



Health



Agriculture



Investment



Applications



Policy & Regulation



Governance



Sensor Networks



Universal Broadband



Green ICT & E-Waste



Capacity Building



Transport



Measurements



Electricity



SMART SOCIETY



Infrastructure Security



Privacy & Security



Water



Digital Inclusion



Spectrum Management



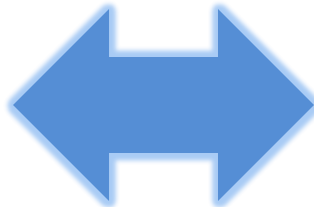
Standards, Conformity & Interoperability



Teleworking

STRATEGIC ALIGNMENT

- **Connectivity and uptake**
- **Sustainability and Security**
- **Interoperability**
- **Reliability**
- **Applications and Services**
- **Enabling environment**



- **Improve quality of life**
- **Achieve sector growth**
- **Meet socio-economic goals**

SMART ISLANDS!

WHAT DO WE NEED?

- **Where is the business growth going to come from?**
 - **Do we have the enabling environment?**
 - **Are networks ready?**