Protecting consumer interest in broadband services

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New Delhi, India

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ITU Regional Office for Asia and the Pacific

ITU: A Brief Overview

Founded in 1865

A specialized agency of the UN with focus on Telecommunication / ICTs

193 Member States
567 Sector Members
159 Associates
100+ Academia

Headquartered in Geneva,
4 Regional Offices
7 Area Offices.

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.

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: Regional Office for Asia and the Pacific

38 Member States

134 Sector Members, Associates

20 Academia

Least Developed Countries (12)

Afghanistan
Bangladesh
Bhutan
Cambodia
Lao, PDR
Nepal
Myanmar
Timor Leste

Land Locked Developing Countries (5)

Small Islands Developing States (12)

Kiribati
Solomon Is.
Tuvalu
Vanuatu
Fiji
Maldives
Marshall Islands
Micronesia
Nauru
Tonga

Low-Income States (10)

PNG
Samoa
D.P.R. Korea
India
Indonesia
Mongolia
Pakistan
Philippines
Sri Lanka
Vietnam

The Rest (10)

Australia
Brunei
China/Hong Kong
Iran
Japan
Malaysia
New Zealand
R.O. Korea
Singapore
Thailand

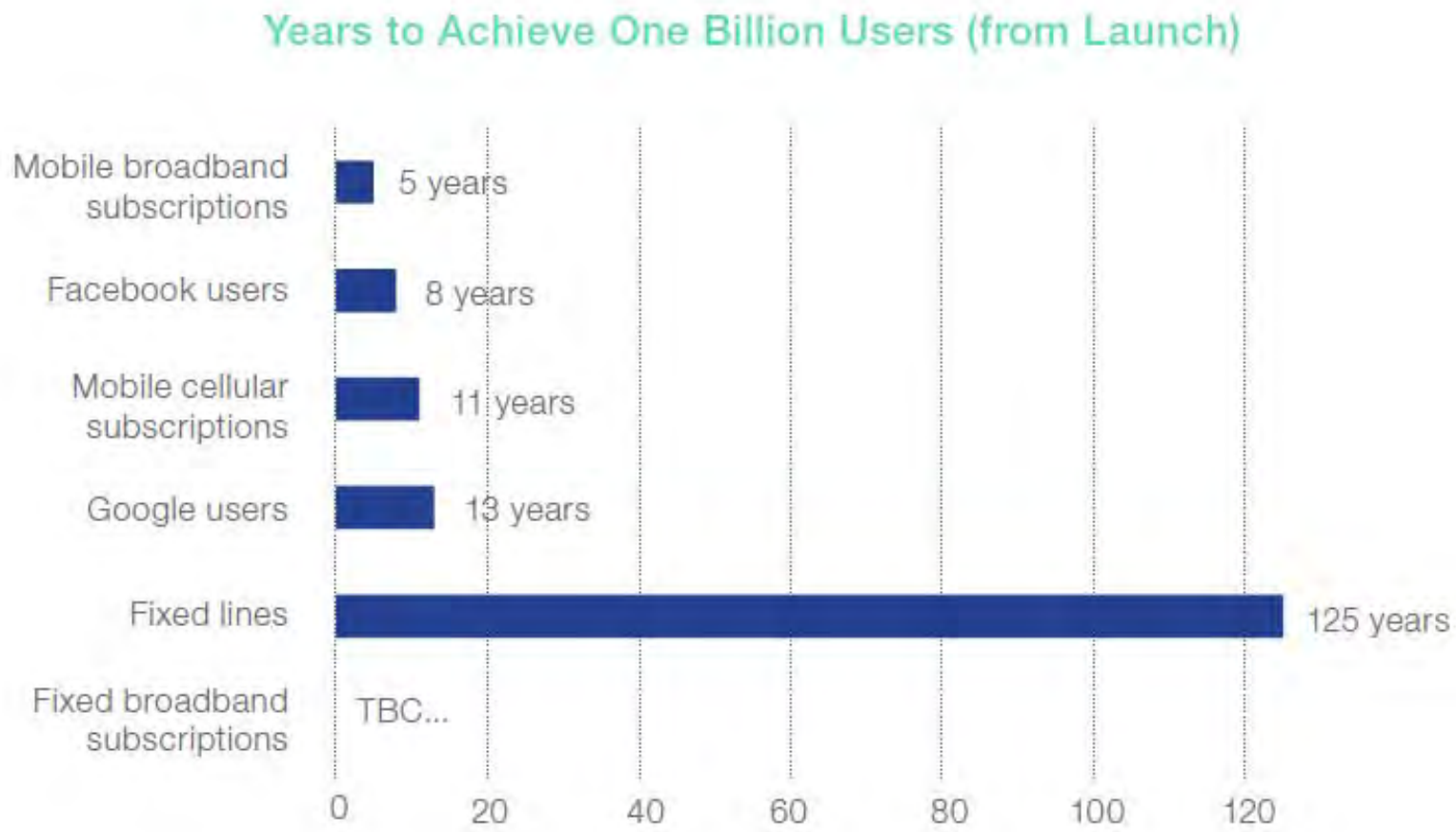
ITU-D Sector & Associate Members: Asia-Pacific Region

1. Afghan Wireless Communication Co.- Afghanistan
2. Asia Pacific Network Information Centre – Australia
3. The Cyber Guardian Pty Ltd. – Australia
4. ADD International - Bangladesh
5. Banglalink Digital Communications Ltd. - Bangladesh
6. Grameenphone (GP) Limited – Bangladesh
7. Robi Axiata Limited - Bangladesh
8. Telekom Brunei Berhad (TelBru) – Brunei Darussalam
9. CHUAN WEI (Cambodia) Co., Ltd. - Cambodia
10. China Telecommunications Corporation – China
11. China International Telecommunication Construction Corporation - China
12. China Unicom (Hong Kong) Ltd. - China
13. Huawei Technologies Co. Ltd.- China
14. Star Software Technology Co. Ltd. - China
15. ZTE Corporation – China
16. Pacific Islands Telecommunications Association - Fiji
17. Secretariat of the Pacific Community (SPC) – Fiji
18. Bharat Broadband Network Limited - India
19. Bharat Sanchar Nigam Ltd. - India
20. Bharti Airtel Limited – India
21. Cellular Operators Association of India
22. Centre for Internet and Society - India
23. ITU-APT Foundation of India
24. RailTel Corporation of India Limited, India
25. Telecom Disputes Settlement & Appellate Tribunal - India
26. Telecom Regulatory Authority of India
27. Vihaan Networks Limited (VNL), India
28. PT. INDOSAT Tbk. - Indonesia
29. PT. Telekomunikasi Indonesia Tbk – Indonesia
30. Irancell Telecommunication Services Company – I.R Iran
31. Iranian Net Communication & Electronic Services Co. – I.R. Iran
32. Telecommunication Company of Iran (TCI) – I.R. Iran
33. Fujitsu Limited - Japan
34. Hitachi, Ltd. – Japan
35. KDDI Corporation - Japan
36. Mitsubishi Electric Corporation - Japan
37. National Institute of Information and Communications Technology – Japan
38. NEC Corporation - Japan
39. Nippon Telegraph and Telephone East Corporation – Japan
40. Nippon Telegraph and Telephone West Corporation – Japan
41. Nomura Research Institute Ltd.- Japan
42. Panasonic Corporation - Japan
43. The ITU Association of Japan
44. Korea Information Society Development Institute (KISDI) – R.O.Korea
45. KT Corporation _ R.O. Korea
46. National Information Society Agency (NIA) – R.O. Korea
47. SK Telecom, R.O. Korea
48. Altel Communications Sdn Bhd - Malaysia
49. Asia-Pacific Broadcasting Union – Malaysia
50. Asia-Pacific Institute for Broadcasting Development – Malaysia
51. Axiata Group Berhad, Malaysia
52. Maxis Mobile Sdn Bhd. – Malaysia
53. MEASAT Satellite Systems Sdn. Bhd. – Malaysia
54. Packet One Networks (M) Sdn Bhd - Malaysia
55. Telekom Malaysia Berhad – Malaysia
56. Communications Regulatory Commission of Mongolia
57. Information Communication Network Company – Mongolia
58. MobiCom Corporation – Mongolia
59. Ncell Pvt.Ltd. - Nepal
60. Nepal Telecom Company Limited- Nepal
61. Nepal Telecommunications Authority – Nepal
62. CMPak Limited, Pakistan
63. Multinet Pakistan (PVT) Limited - Pakistan
64. Pakistan Mobile Communications Limited – Pakistan
65. Telenor Pakistan (Pvt) Ltd. – Pakistan
66. Center for Strategic and Policy Analysis Technology Policy Commission - Pakistan
67. Smart Communications, Inc. – Philippines
68. Telecentre.org Foundation – Philippines
69. ROHDE & SCHWARZ Regional Headquarters Singapore Pte. Ltd. - Singapore
70. Sri Lanka Telecom Ltd. – Sri Lanka
71. Advanced Info Service Public Company Ltd. – Thailand
72. Advanced Wireless Network Company Limited - Thailand
73. Asia-Pacific Telecommunity – Thailand
74. Total Access Communication PLC – Thailand
75. True Corporation Public Co., Ltd. – Thailand
76. Viettel Corporation, VietNam

ITU Academia Members: Asia-Pacific Region

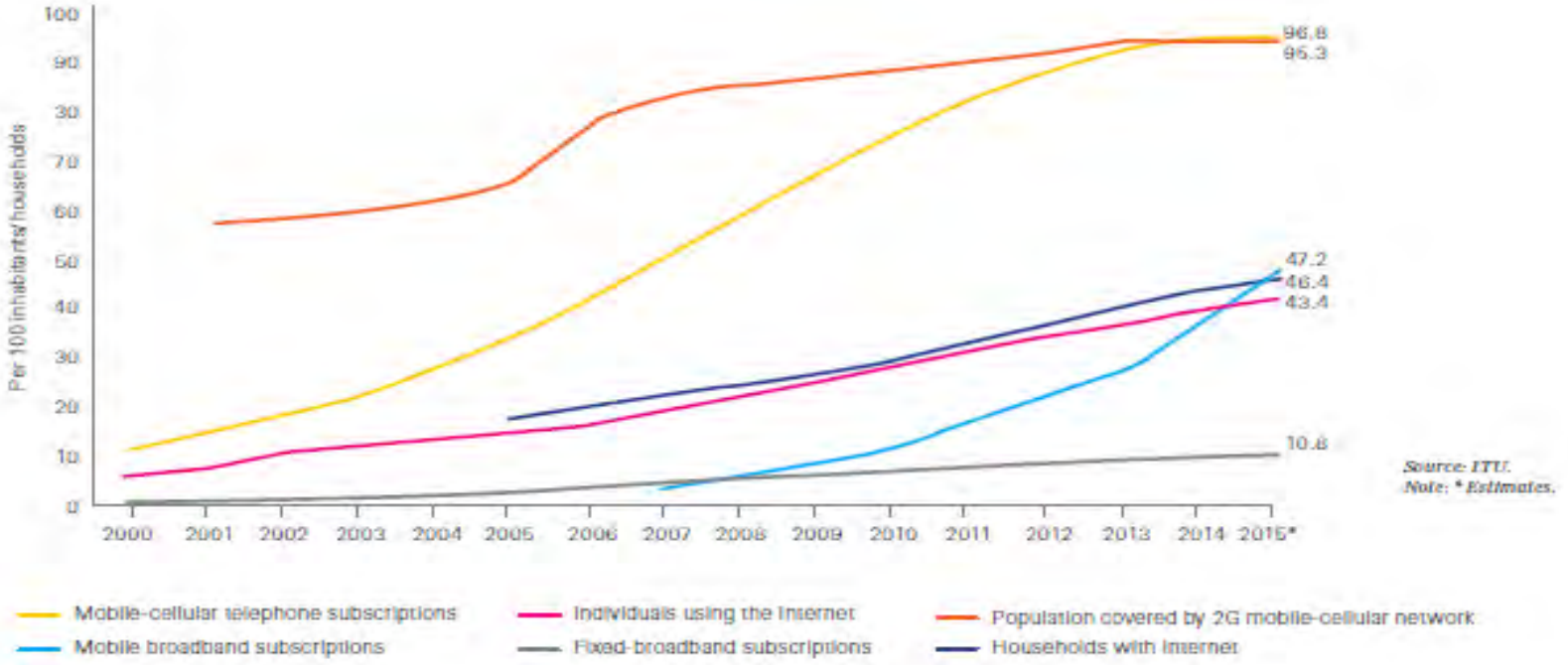
Bangladesh	• World University of Bangladesh
China	• Beijing University of Posts and Telecommunications • Chongqing University • Nanjing University of Posts and Telecommunications (NUPT) • Tsinghua University • Zhejiang University
India	• Amity Institute of Telecom Engineering & Management, Amity University • HMR Institute of Technology Management • Indian Institute of Technology Bombay • PES Institute of Technology • Telecom Centre of Excellence (TCOE) India
Iran	• Iran University of Science & Technology
Japan	• The University of Tokyo • Waseda University
Korea	• Hankuk University of Foreign Studies • Korea Advanced Institute of Science & Technology
Malaysia	• Universiti Sains Malaysia
Thailand	• Bangkok University • Chulalongkorn University Faculty of Engineering • Thammasat University, College of Innovation

Mobile Broadband is the Fastest-Growing ICT Service in History



Source: State of Broadband 2015

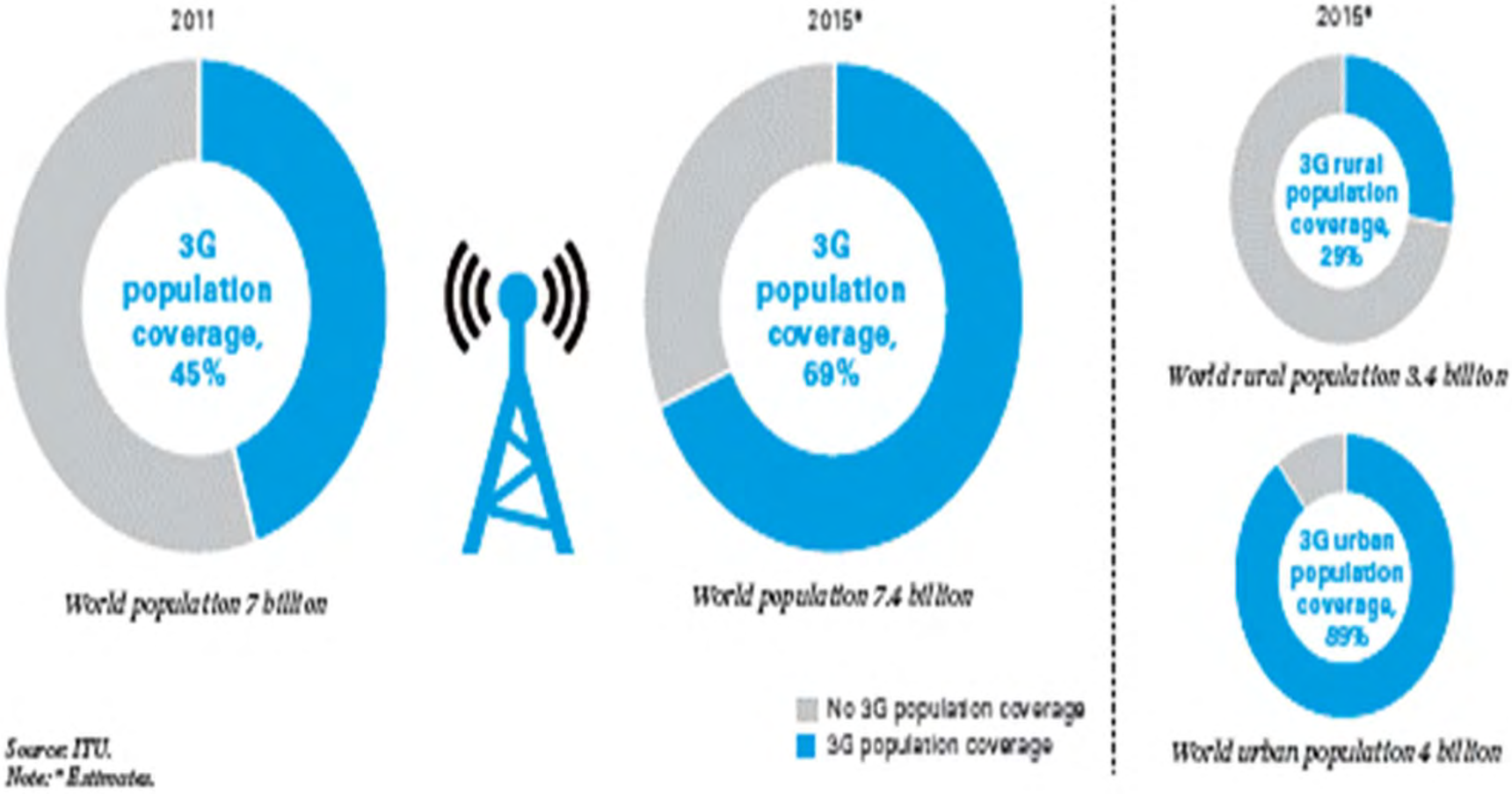
15 Years of ICT Growth: What has been achieved?



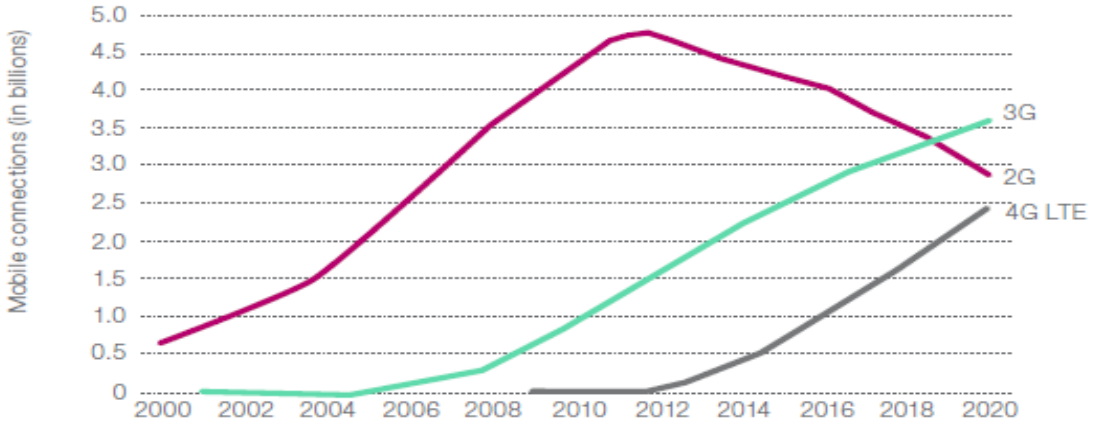
- By end 2015, there are more than 7 billion mobile cellular subscriptions, corresponding to a penetration rate of 97%, up from 738 million in 2000
- Between 2000-2015, global Internet penetration grew 7 fold from 6.5% to 43%
- Mobile broadband is the most dynamic market segment; globally, mobile-broadband 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

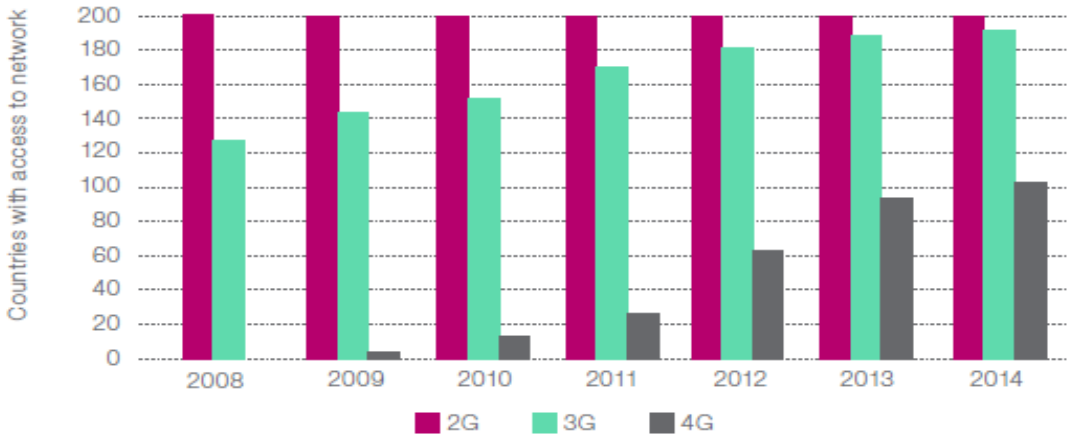
3 G Mobile Broadband Coverage: Extending in Rural Areas



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.

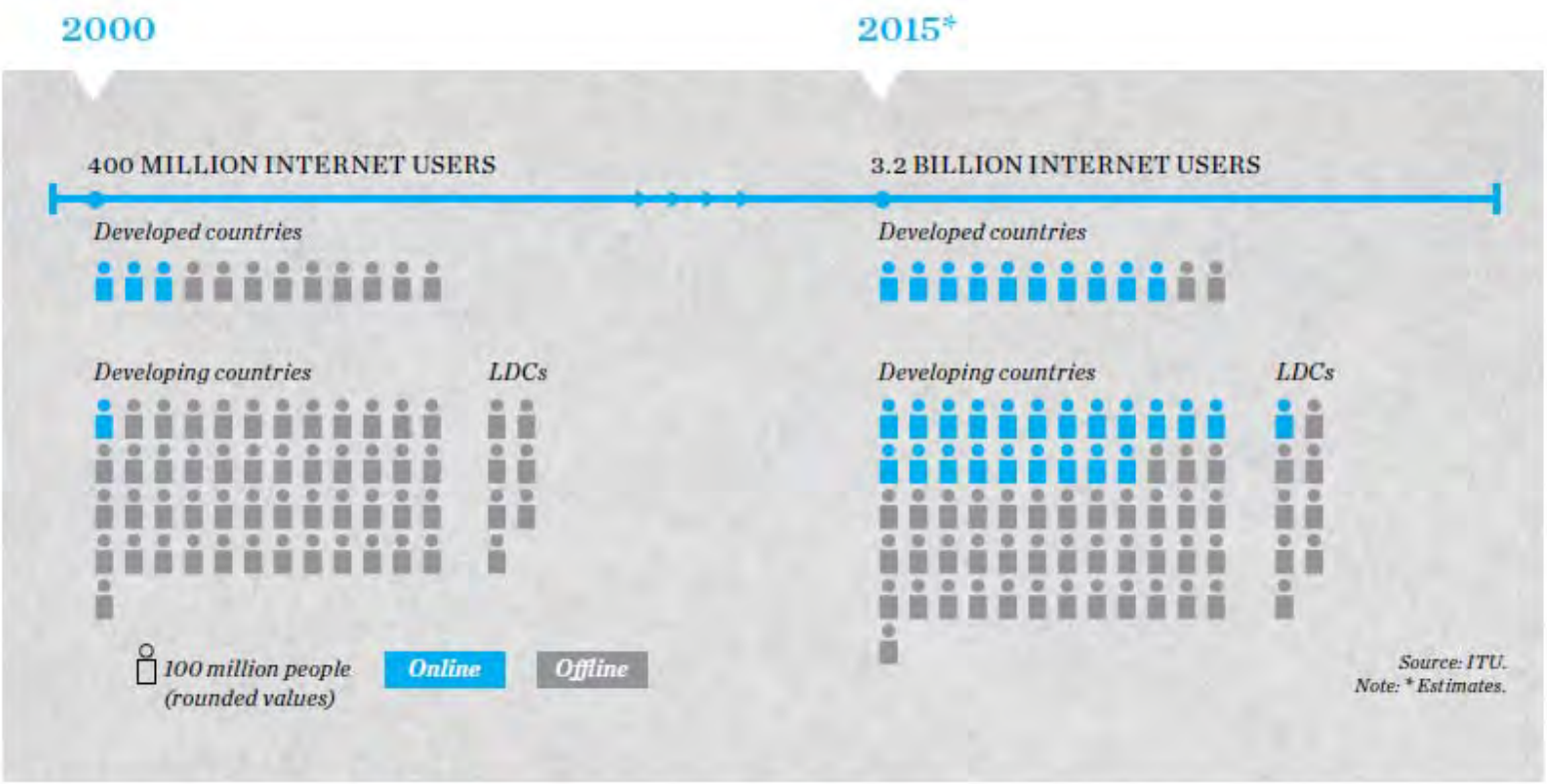


In July 2015, the Global mobile Suppliers Association (GSA) reported that 422 operators had launched commercial LTE systems in 143 countries, projecting 460 commercially launched LTE networks by end 2015.

ces: 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).

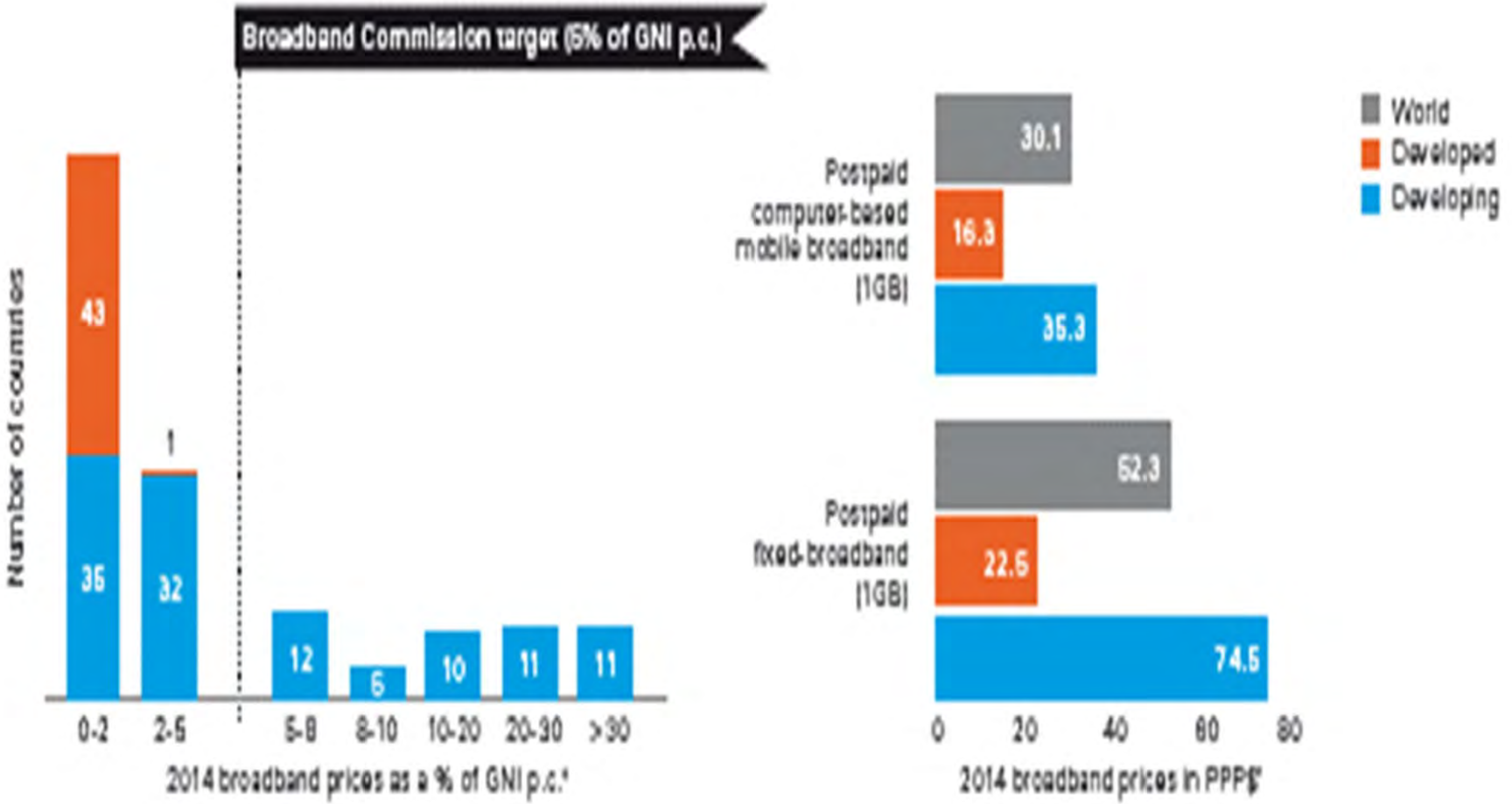
Status of Internet Access



- 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

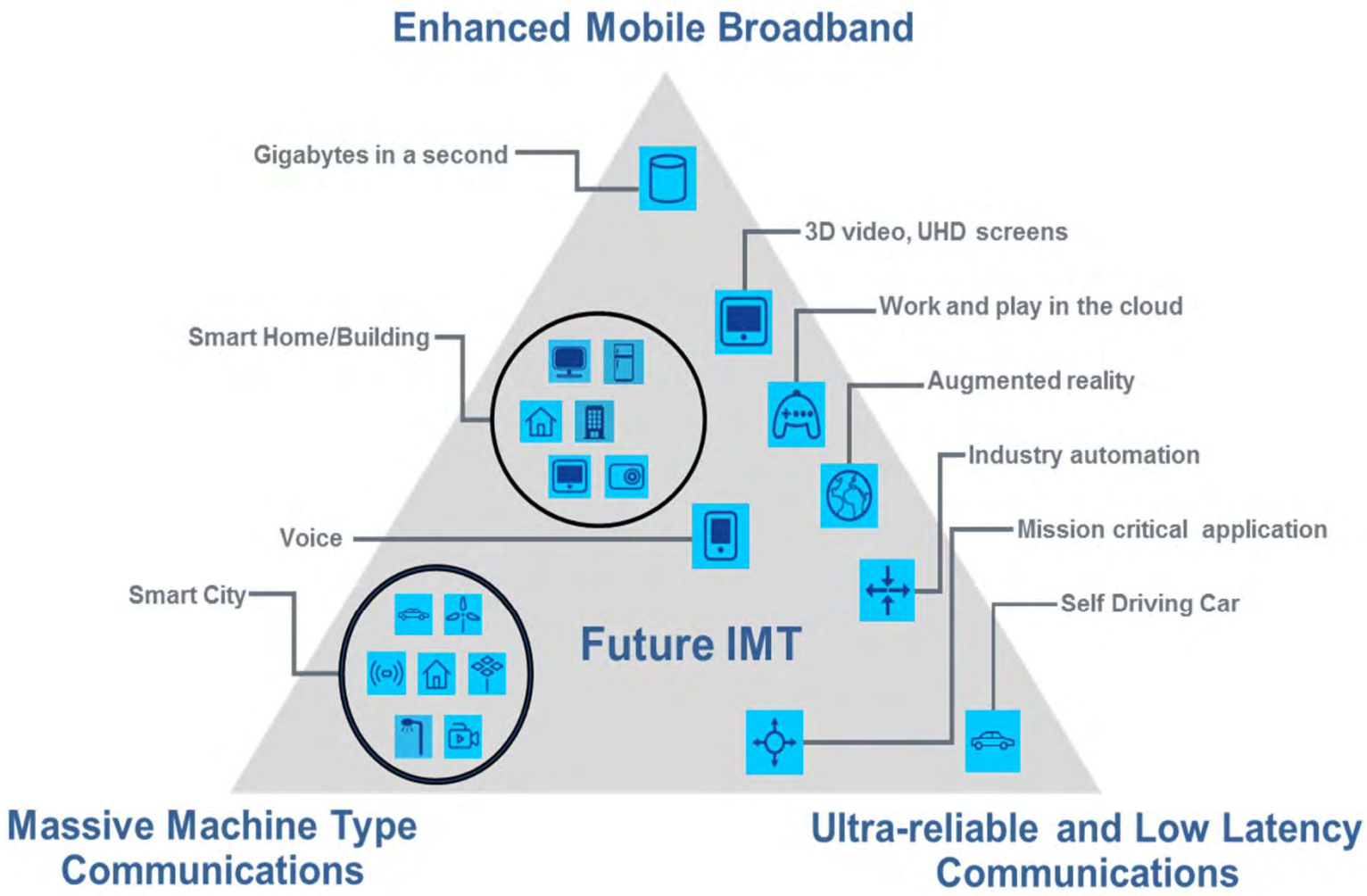
Source: ITU

Broadband now affordable in 111 countries
MBB less expensive than FBB



IMT 2020 (5G)

Usage Scenarios for IMT 2020



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

Agreed Global Telecommunication/ICT Targets – 2020

ITU Plenipotentiary Conference 2014

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

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

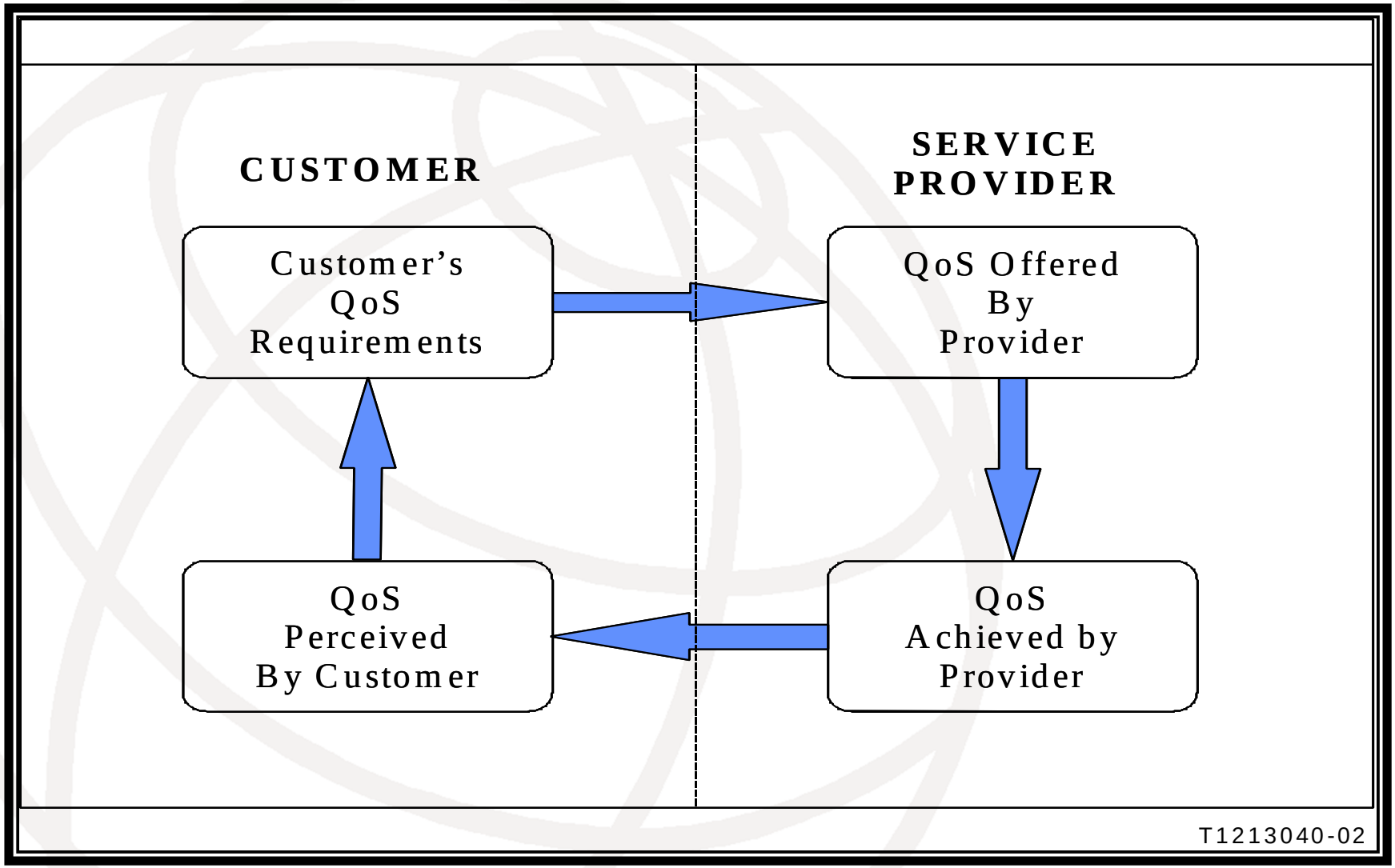
Quality Objectives

- To maintain a basic minimum level of quality
- To use competition to improve quality
- To promote consumer choice over quality vs price
- To ensure quality choices are available for all groups of consumers

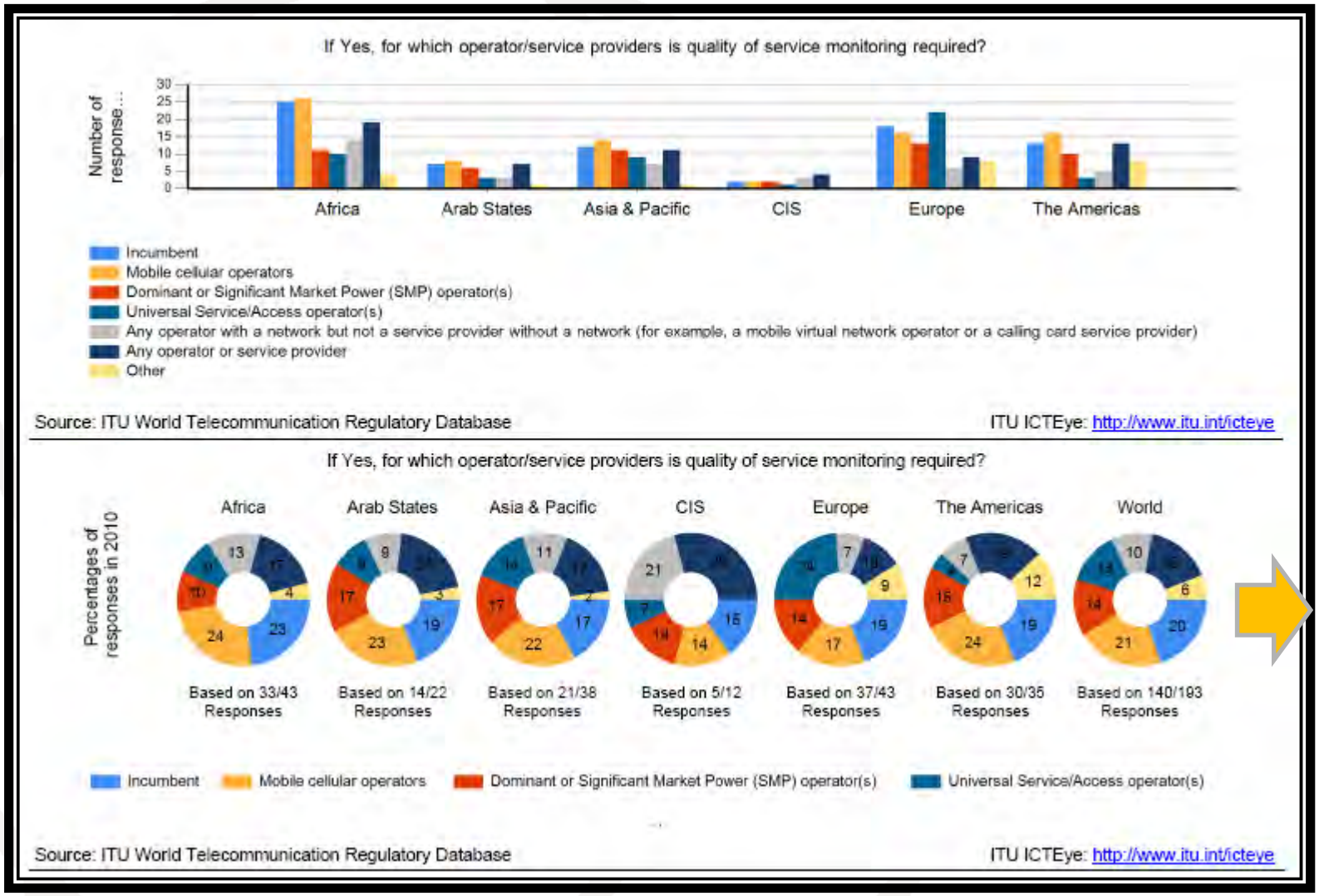
Quality of Service Definition

- Quality: The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs (ISO 8402)
- Quality of Service (QoS): the collective effect of service performances, which determine the degree of satisfaction of a user of the service (ITU-T Rec. E.800).

Four Viewpoints of QoS

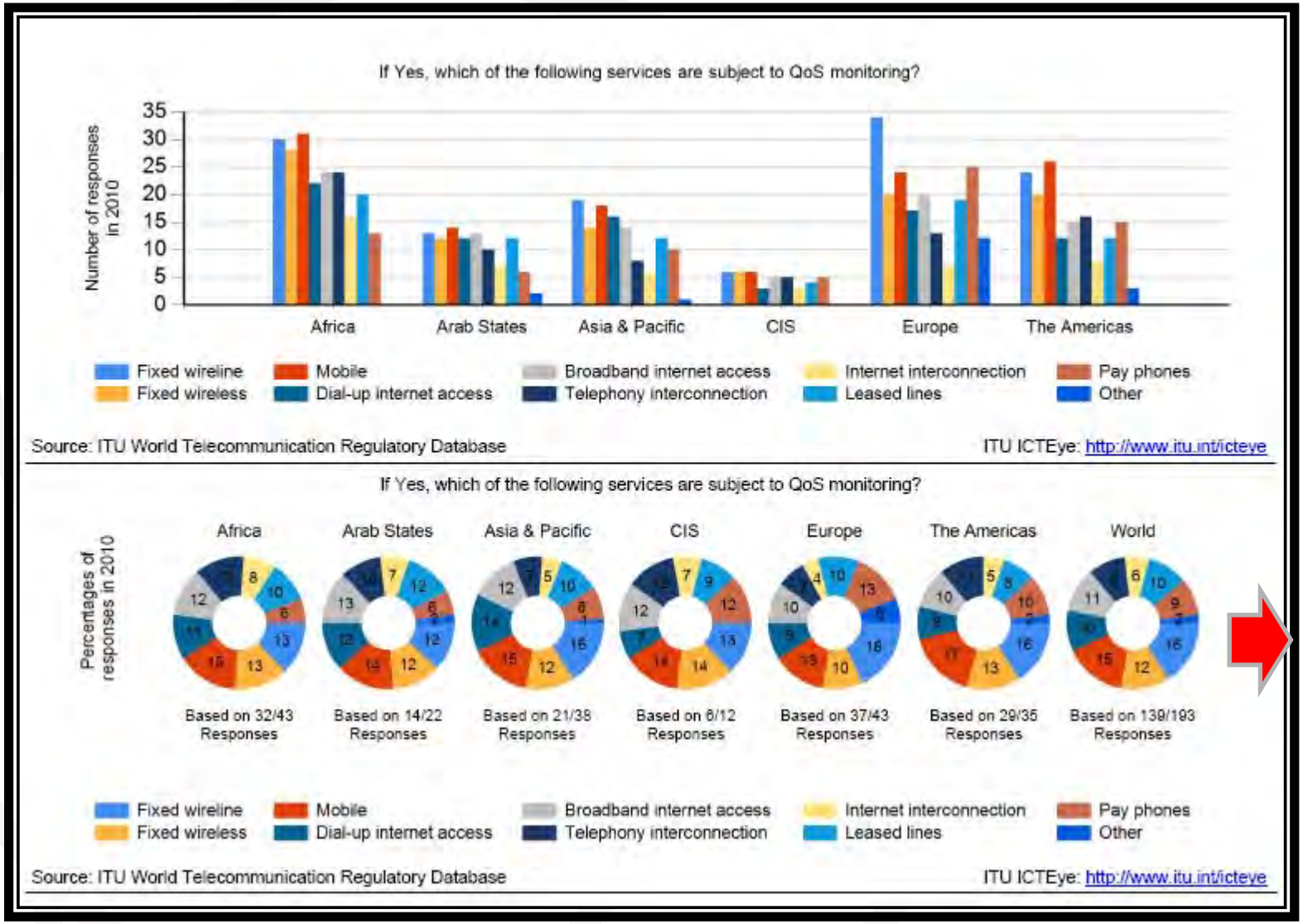


QOS monitoring required for What Type of Operators?



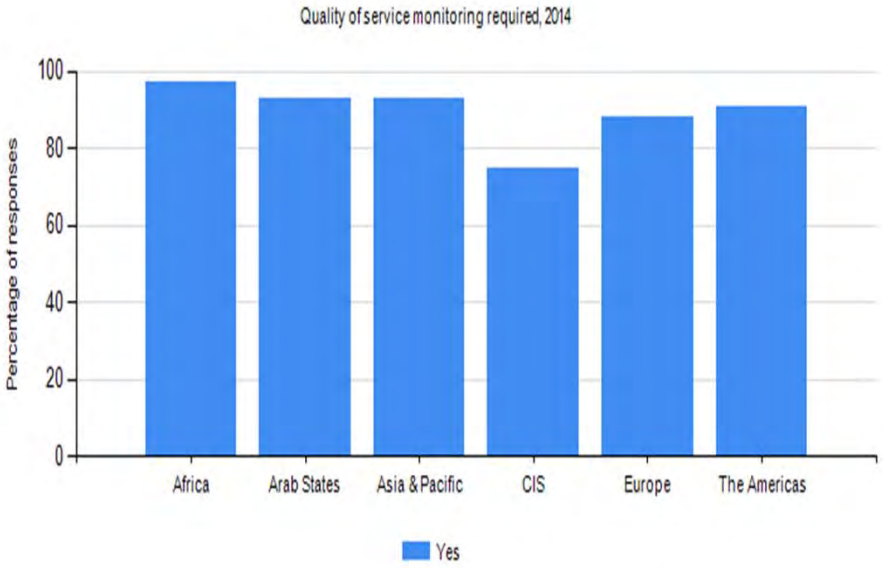
21%

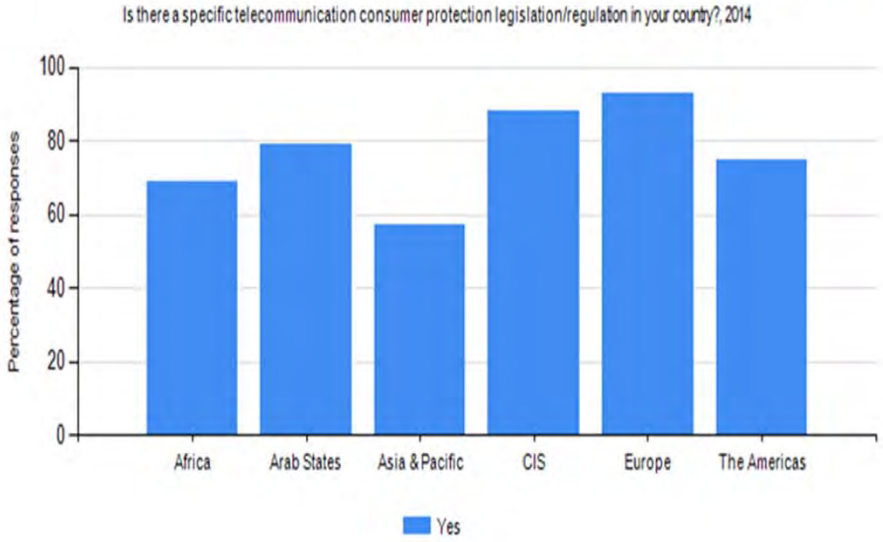
QoS monitoring required for What Type of Services ?

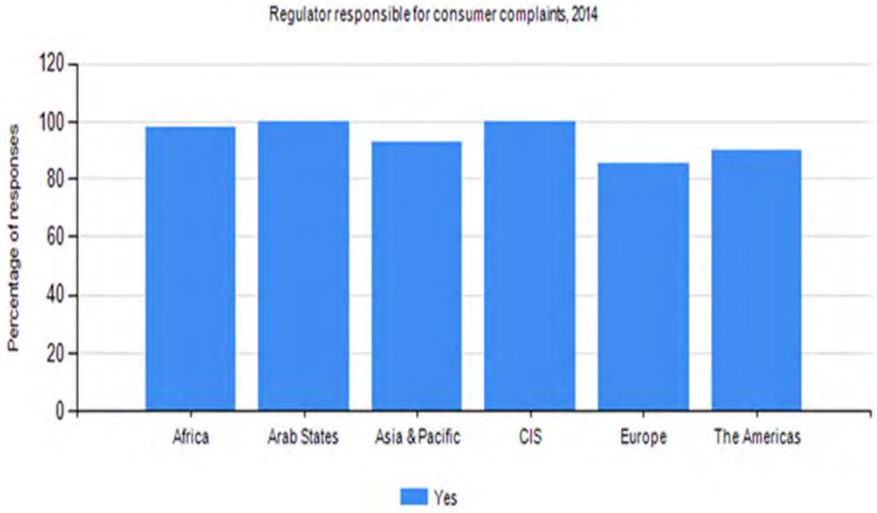


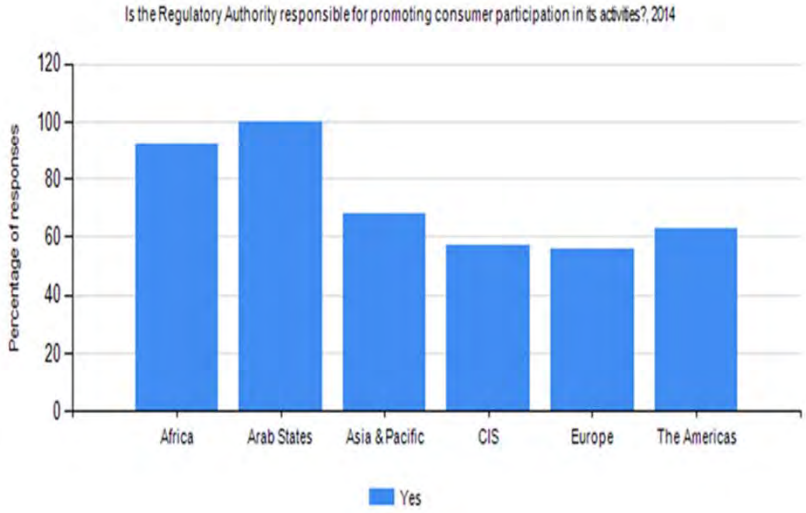
15%

ITU Survey on QOS and Consumer Protection-I

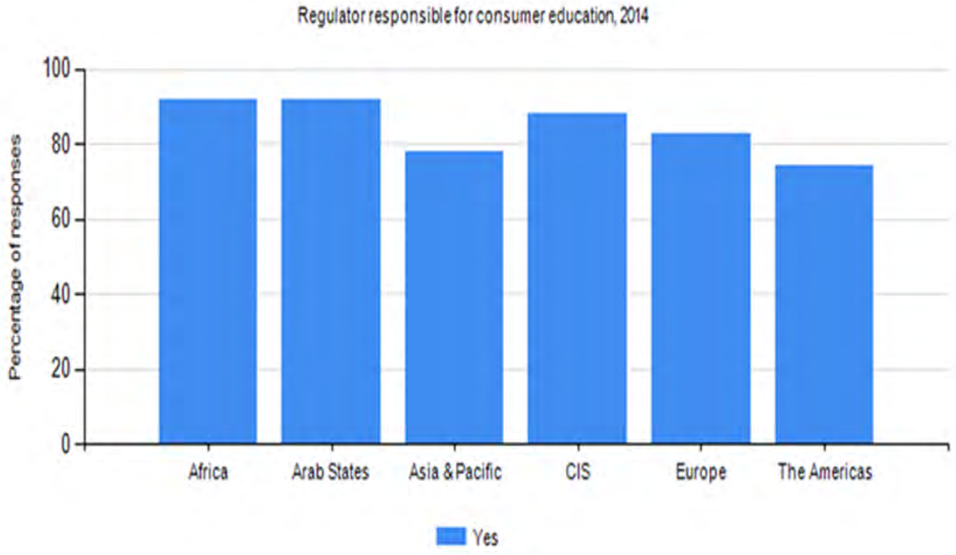


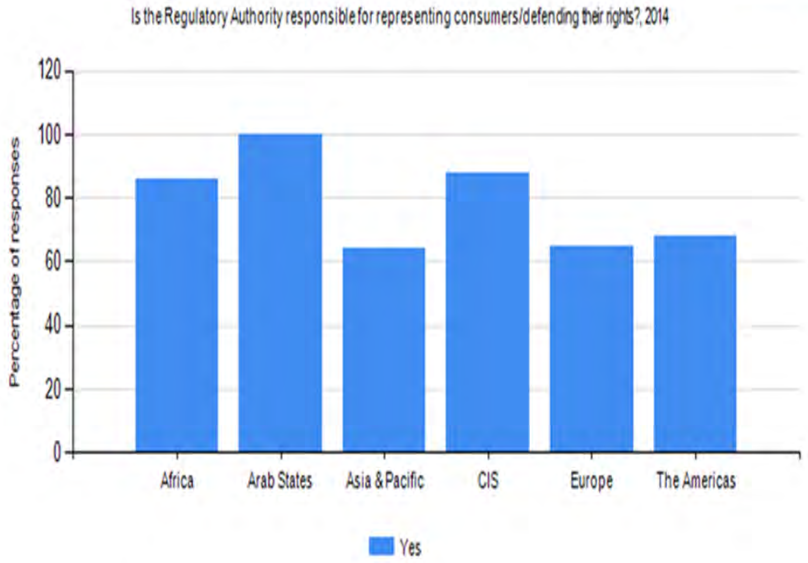


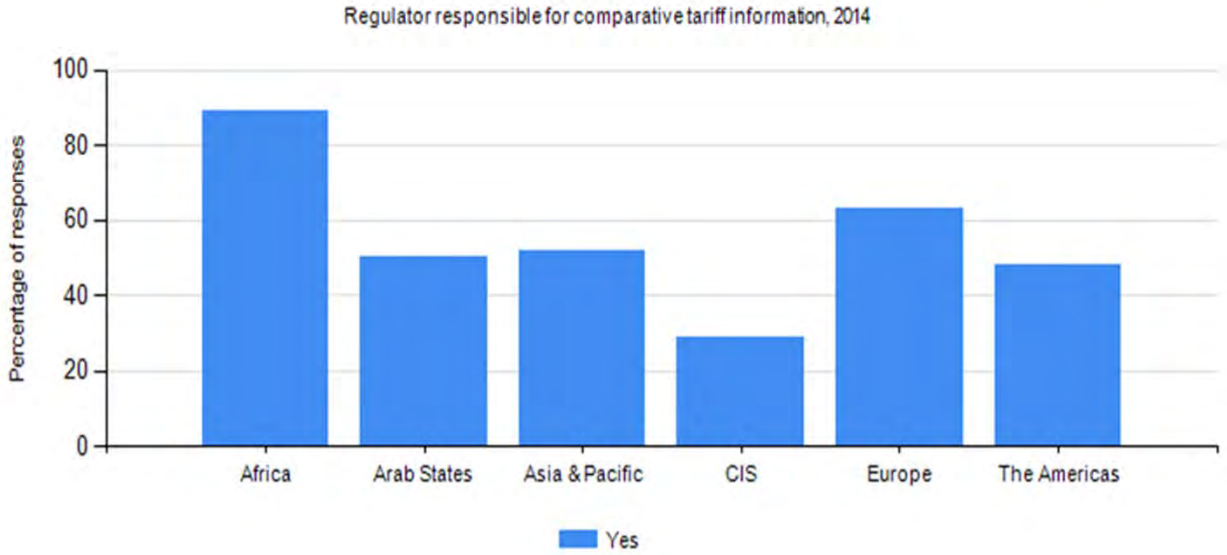




ITU Survey on QOS and Consumer Protection-II





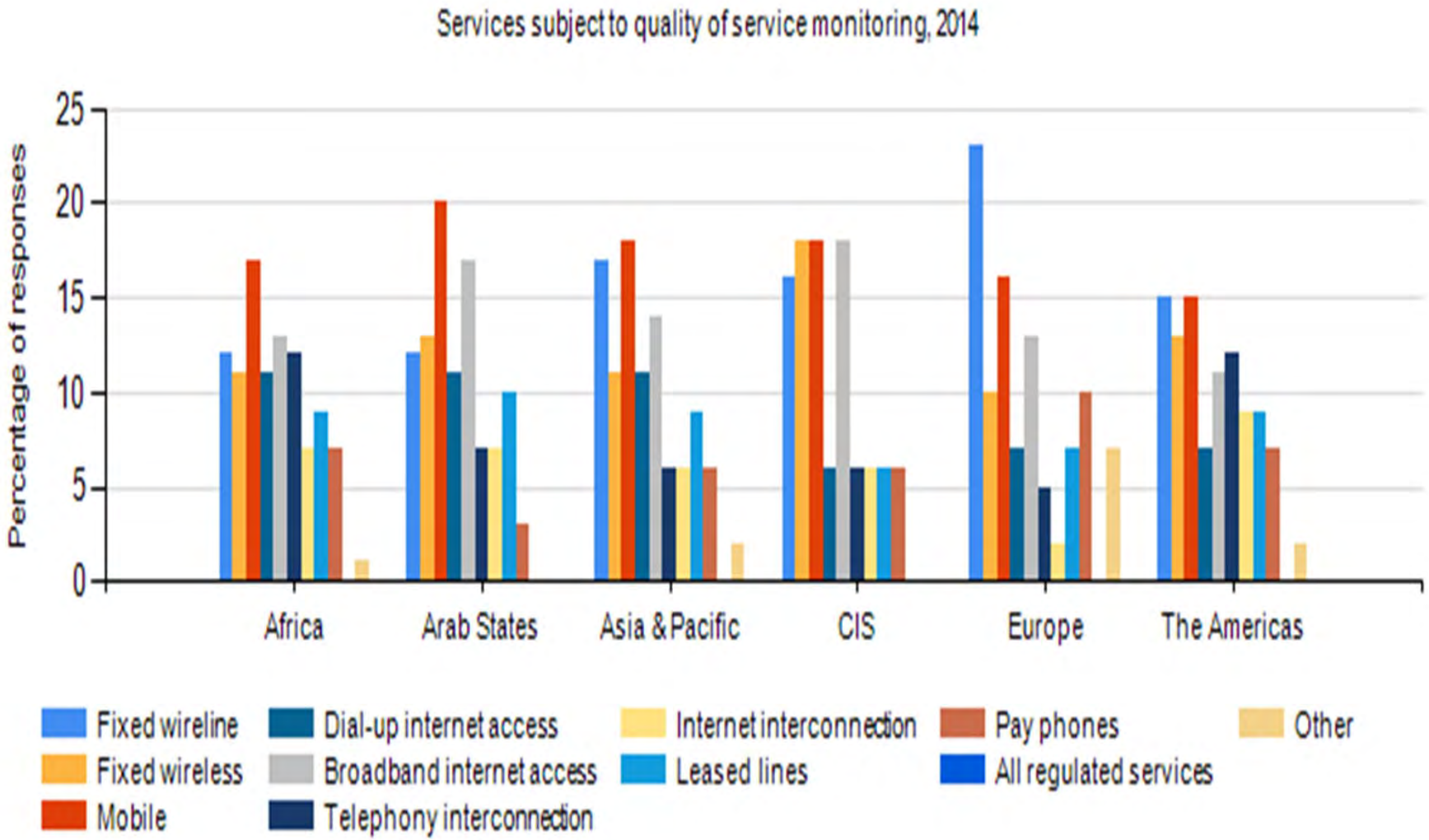


How Countries are Measuring QoS?

	United Kingdom	France	Germany	Austria	Italy	Netherlands	Belgium	Denmark	Portugal	Finland	Latvia	Czech Republic	Slovakia	Romania	Switzerland	Turkey	United States	Canada	India	Singapore
Types of services under QoS regulation																				
Universal service	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔			✔	✔
Fixed-line telephony		✔	✔		✔		✔				✔	✔		✔		✔	✔	✔	✔	✔
Mobile telephony					✔		✔				✔	✔				✔			✔	✔
Internet					✔		✔				✔			✔					✔	✔
Parties measuring QoS																				
Operators	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Regulatory agencies		✔									✔									
Third party	✔				✔											✔				
Frequency of publication of QoS data																				
Quarterly reports		✔				✔			✔	✔				✔		✔		✔	✔	✔
Half-year reports	✔				✔		✔						✔							
Annual reports		✔	✔	✔	✔			✔			✔	✔			✔		✔			

Source: A.T. Kearney analysis

Services subject to QoS Monitoring



ITU- T SG 12 Mandate

- Performance, QoS and QoE
- Responsible for Recommendations on performance, quality of service (QoS) and quality of experience (QoE) for
  - full spectrum of terminals, networks and services
    - ranging from speech over fixed circuit-based networks to multimedia applications over networks that are mobile and packet based
- Included are
  - operational aspects of performance, QoS and QoE
  - end-to-end quality aspects of interoperability
  - development of multimedia quality assessment methodologies, both subjective and objective.
- SG 12 is the Lead SG on
  - quality of service and quality of experience
  - driver distraction and voice aspects of car communications
- http://www.itu.int/en/ITU-T/studygroups/2013-2016/12/Pages/default.aspx

SG 12 Recommendations

- E-Series: Overall Network Operation, telephone service, telephone operation and human factors
  - E.420-E.479, E.800-E.859
- G-Series: Transmission Systems and media, digital systems and networks
  - G.100-series, except G.160-, G.180- and G.190-series, G-1000 series
- I-Series: Integrated Services Digital Network
  - I.350-series (including Y.1501/G.820/I.351), I.371, I.378, I.381
- P-Series, except P.900-series:Terminals, subjective and objective test methods
- Y-Series: Global Information infrastructure, Internet Protocol aspects and Next Generation Networks
  - Y.1220-, Y.1530-, Y.1540-, Y.1560-series

Basic definitions: ITU-T Rec. E.800

- Network Performance (NP)
  - Pre-requisite to Quality of Service (QoS)
  - Not directly visible to the user
- Quality of Service (QoS)
  - Performance of the Service offered to the User
  - Some QoS Aspects directly perceivable, some indirectly

Network Performance

- Charging Performance
- Provisioning Performance
- Administration Performance
- Availability Performance
- Transmission Performance

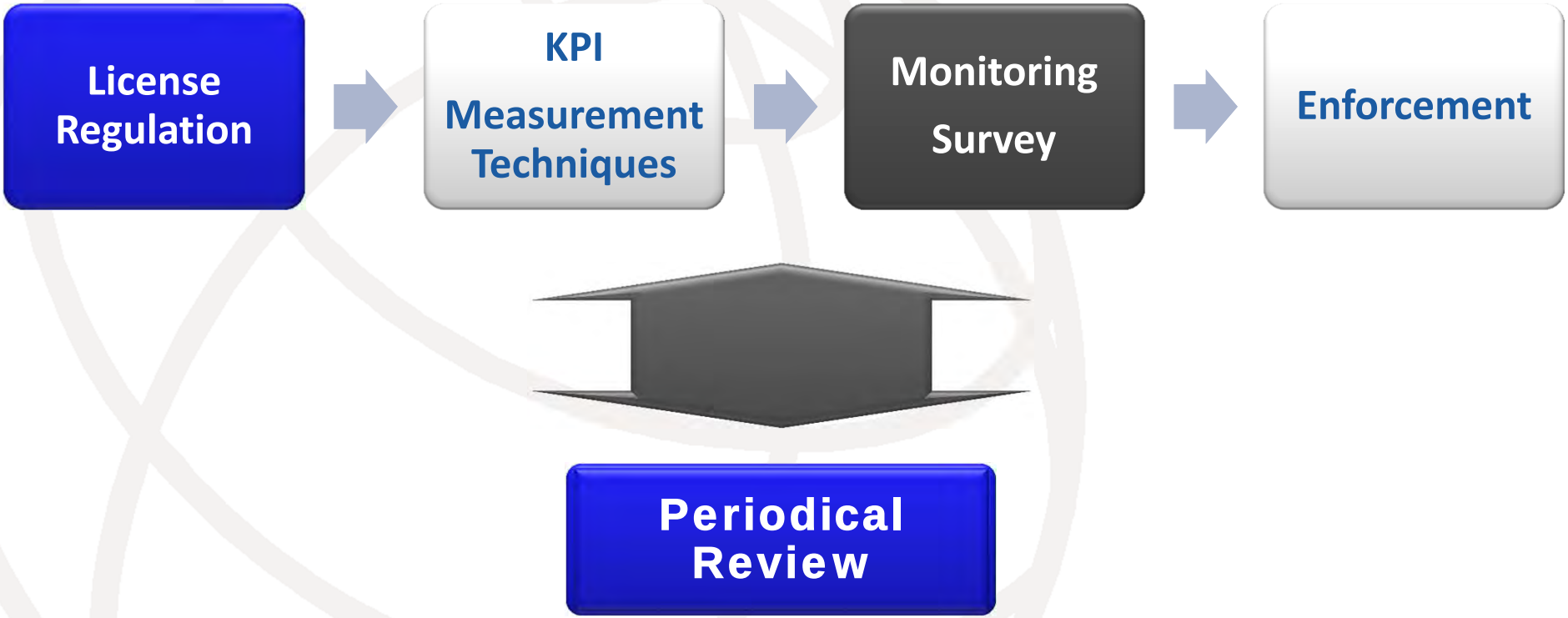
Quality of Service

- Service Support Performance
- Service Operability Performance
- Serveability
- Service Security Performance

QoE Definition

- ITU-T Rec. G.100 / P.10 defines
  - Quality of Experience (QoE): The overall acceptability of an application or service, as perceived subjectively by the end-user.
  - NOTE 1 – Quality of experience includes the complete end-to-end system effects (client, terminal, network, services infrastructure, etc.).
  - NOTE 2 – Overall acceptability may be influenced by user expectations and context.

QoS Regulatory Framework-I



Quality of Service Regulatory Framework-II

Standards → **License Regulation** → **KPI Measurement Techniques** → **Monitoring Survey** → **Enforcement**

- 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

Use of QoS Parameters

QoS Level

- Specifying the level of quality of service in customer telecommunication service contracts or in the description of terms and conditions of the service
- Comparing the level of quality and quality commitments of services of different service providers

QoS Level Attributes

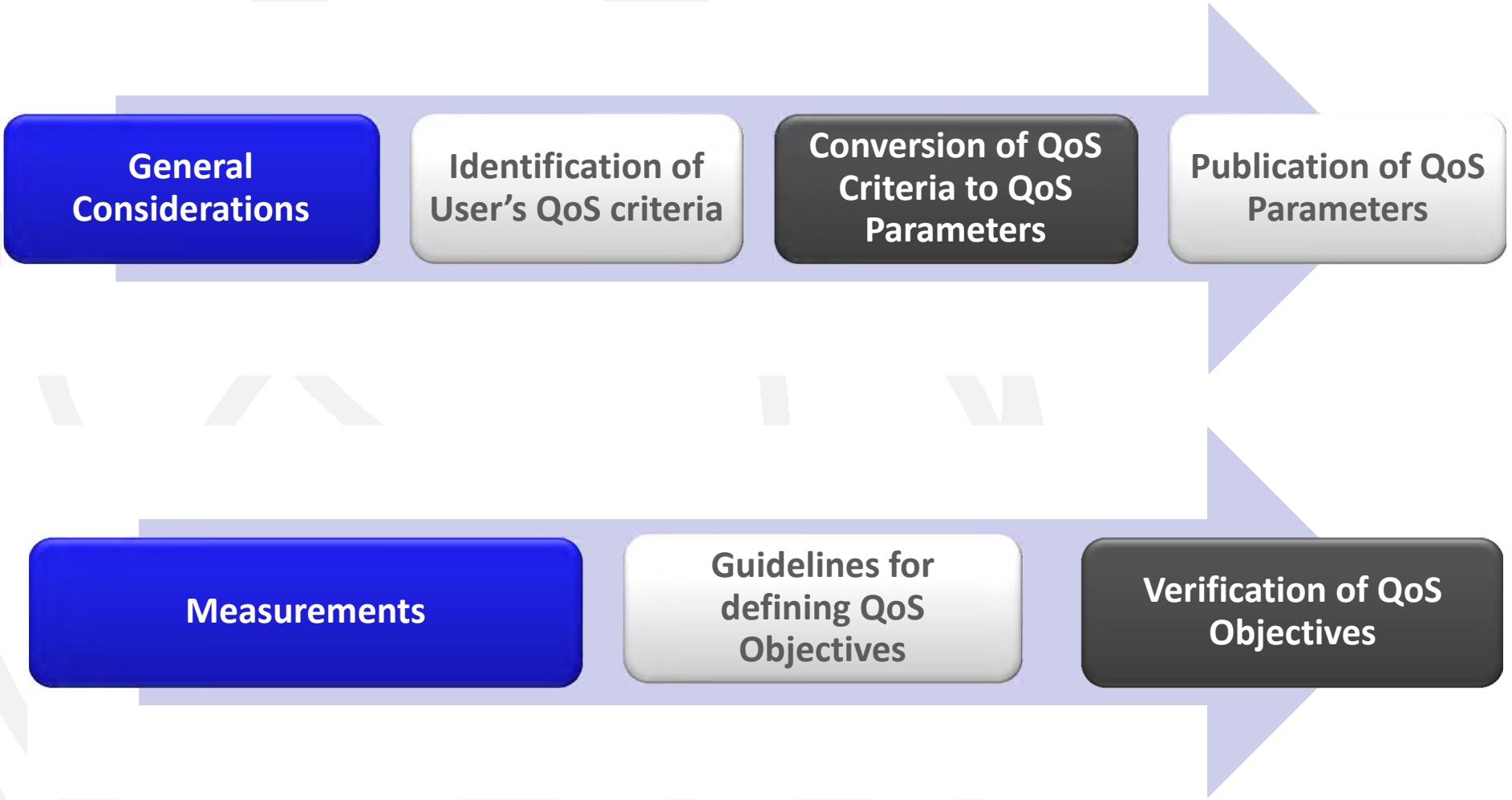
- Preparing long-term studies on the level of quality attributes of a specific service
- Preparing statistics, reports and publications of the quality of a service.

QoS Minimum Level & Regulatory Compliance

- Regulatory purpose including specification of the minimum level of quality
- Monitoring of services by, for example, reports on a regular basis and statistics for specific situations

Source: ITU-T Recommendations E.802

Methodology to Identify of QoS Criteria & Parameters



Please read ITU-T Rec. 802 for details and examples

General Aspects of QoS Parameters

QoS Parameters

- To be considered on a service-by-service basis
- To be specified in terms understandable to the customers

QoS Criteria

- To be specified on an end-to-end basis, at which the user's terminals are connected
- To be specified in terms understandable to the customers
- To be specified in more technical terms for use within the industry

QoS Priority

- Customer may require different order of priority for various performance parameter
- QoS profile of a customer segment may vary with time and it is essential for the service provider to ascertain the customer's changing requirements

Source: ITU-T Recommendations E.802

Choosing Quality of Service Parameters

Purpose

- The precise purpose for which the parameters will be used

Expectation

- The quality and performance as expected by the users of state-of-the-art technology

Relevance & Usefulness

- The usefulness and relevance of the parameters from the users‘ perspective.

Reliability

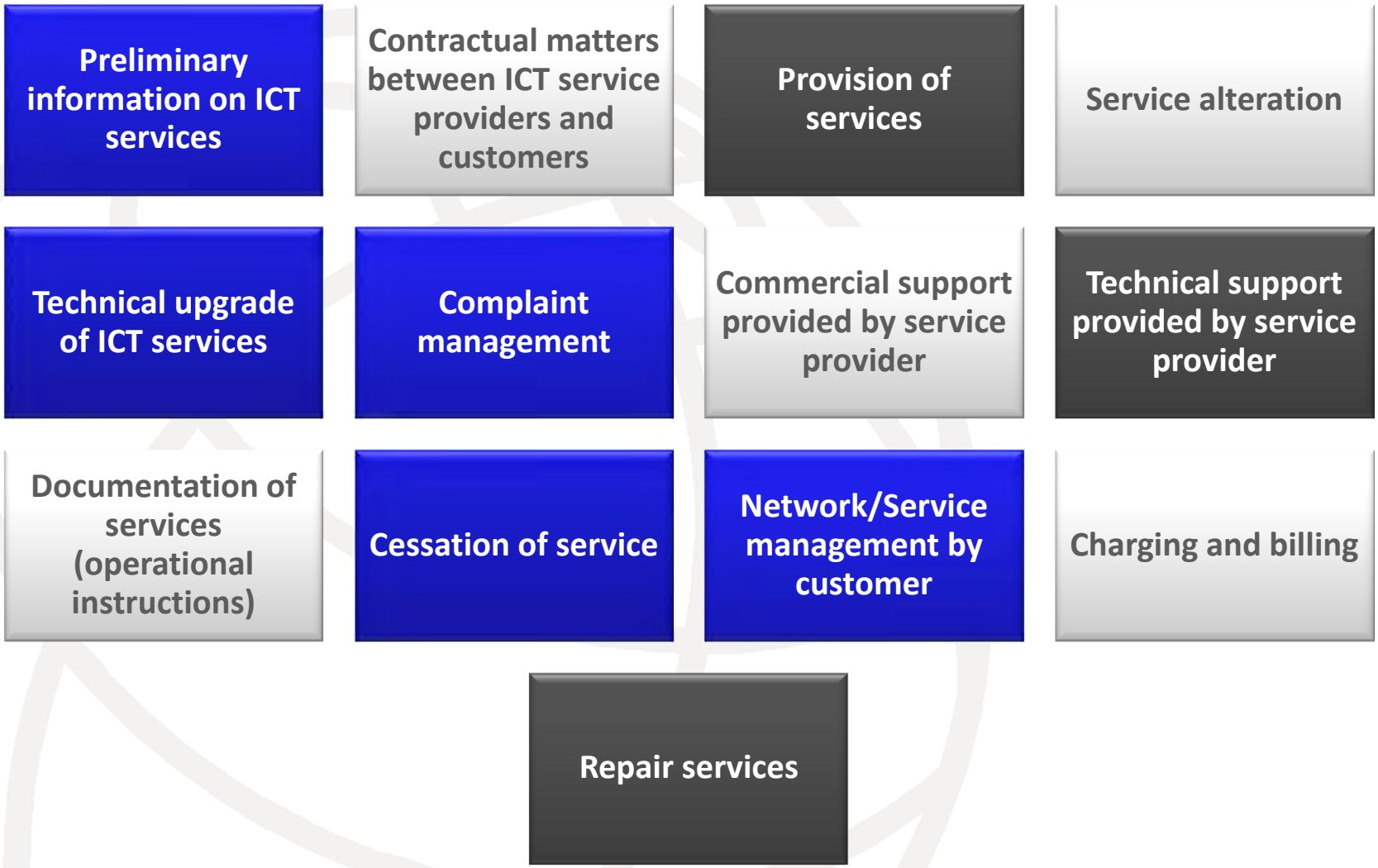
- The degree to which the parameters will provide a reliable comparison of performance.

Cost & Resources

- The cost and resources needed in order to measure and report each parameter.

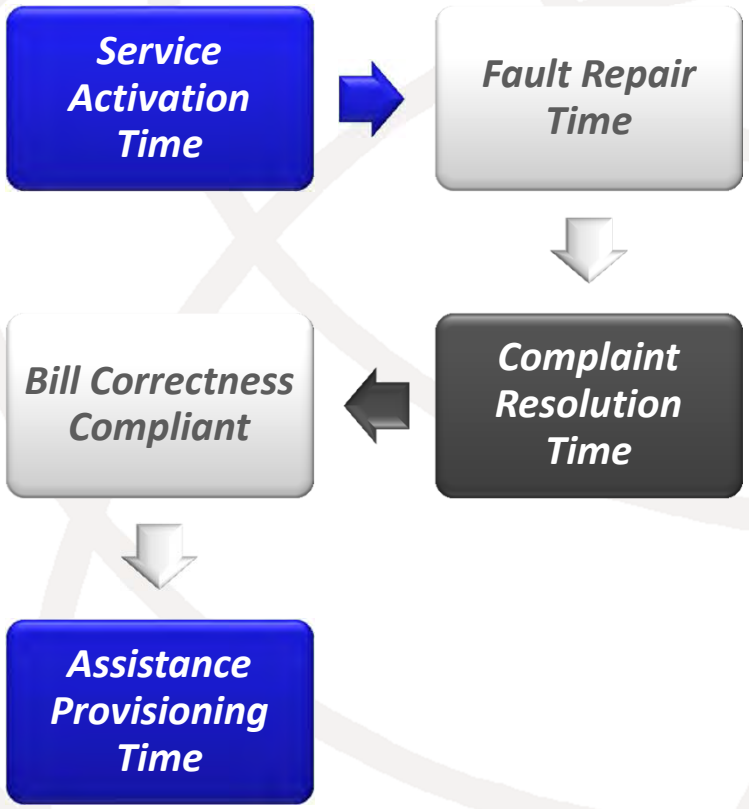
Source: ITU-T Recommendations E.802

Potential QoS Parameters Classified under Categories



For details of QoS parameters that have been identified as being potentially useful for comparison of SPs' performance levels , please read ITU-T Recommendations E.803

Non-Technical Parameters



- **CUSTOMER SATISFACTION**
  - Service quality
  - Service availability
- **PROVISION OF SERVICE**
  - Service activation / de-activation / restoration time
  - If target value is not reached, further analysis might be necessary
- **NETWORK AVAILABILITY**
  - MDT (Mean Down Time)
  - MTTF (Mean Time To Failure)
  - MTBF (Mean Time Between Failures)
- **BILLING INFORMATION**
  - Clarity of tariff plans
  - Ease of switching between plans
  - Ease of getting billing information
  - Ease of bill payments Ease of bill payments
  - Ease of getting refunds
  - Billing accuracy

Performance Measurement : ITU Recommendations

G.1011	• Provides a reference guide to existing standards for quality of experience (QoE) assessment methodologies
G.1030	• Provides a framework of tools to obtain IP network performance, estimate the performance of user applications, and apply perceptual models to gauge user satisfaction with the end-to-end performance
G.1050	• Describes an IP network model that can be used for evaluating the performance of IP streams
P.1501	• Describes the method and procedures for subjective testing of user perceived quality of web browsing

Regional and Global IDI

Economy	2015	2015	IDI 2015	2010	IDI 2010	2015-2010
Korea (Rep.)	1	1	8.93	1	8.64	0
Hong Kong, China	2	9	8.52	13	7.41	4
Japan	3	11	8.47	9	7.73	-2
Australia	4	13	8.29	15	7.32	2
New Zealand	5	16	8.14	19	7.17	3
Singapore	6	19	8.08	11	7.62	-8
Macao, China	7	24	7.73	14	7.38	-10
Malaysia	8	64	5.90	61	4.85	-3
Brunei Darussalam	9	71	5.53	53	5.05	-18
Thailand	10	74	5.36	92	3.62	18
Maldives	11	81	5.08	82	3.92	1
China	12	82	5.05	87	3.69	5
Mongolia	13	84	5.00	97	3.52	13
Iran (I.R.)	14	91	4.79	99	3.48	8
Philippines	15	98	4.57	105	3.16	7
Fiji	16	101	4.33	102	3.28	1
Viet Nam	17	102	4.28	94	3.61	-8
Indonesia	18	108	3.94	109	3.11	1
Tonga	19	110	3.82	111	3.08	1
Sri Lanka	20	115	3.64	115	2.97	0
Bhutan	21	119	3.35	128	2.02	9
Samoa	22	122	3.11	121	2.43	-1
Vanuatu	23	125	2.93	124	2.19	-1
Cambodia	24	130	2.74	131	1.98	1
India	25	131	2.69	125	2.14	-6
Nepal	26	136	2.59	140	1.75	4
Lao P.D.R.	27	138	2.45	135	1.92	-3
Solomon Islands	28	139	2.42	139	1.78	0
Myanmar	29	142	2.27	150	1.58	8
Pakistan	30	143	2.24	138	1.79	-5
Bangladesh	31	144	2.22	148	1.61	4
Afghanistan	32	156	1.83	156	1.37	0
Average			**4.70**		**3.85**	

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


Privacy & Security


Infrastructure Security


Water

SMART SOCIETY


Digital Inclusion


Spectrum Management

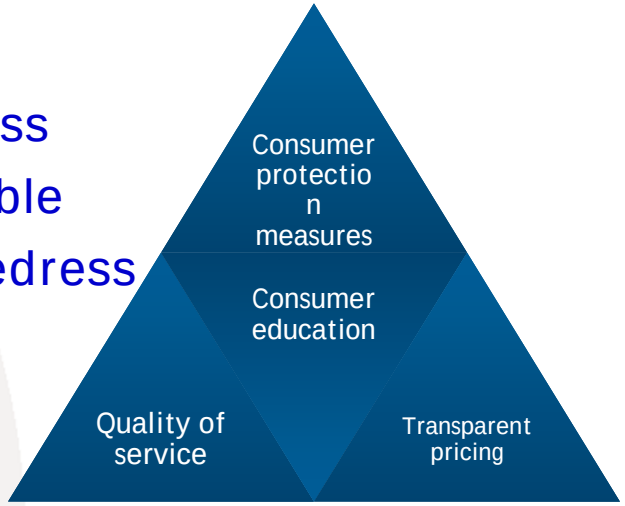

Standards, Conformity & Interoperability


Teleworking

Conclusions

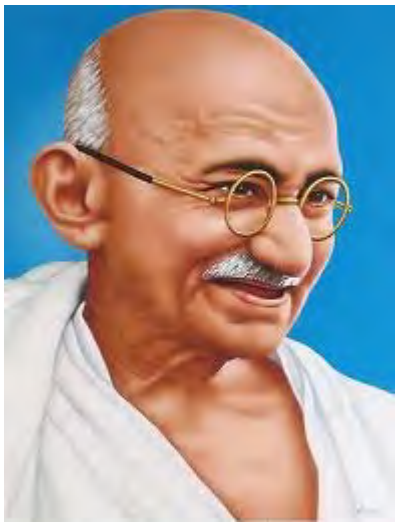
- New services, new challenges for consumers

- What regulators can do:
  - Promote consumer involvement and awareness
  - Ensure accurate reliable information is available
  - Ensure consumers have access to effective redress
  - Enforceability of standards where necessary
  - Global response to security concerns



- 9-11 May 2016, Haarlem/Amsterdam, The Netherlands: ITU workshop on Quality of Service and Quality of Experience of Multimedia Applications and Services

- Possibility to host a QoS/QoE related workshop with SG12 experts



“Be the change that you wish to see in the world.”


Thank You