

# ***Economic Contribution of Broadband (VHCN) and ICT Regulation***

Conference: ***The EECC and its impact on investment  
in very high capacity networks (VHCN)***  
Florence, Italy, 13 December 2019

*Eun-Ju Kim Ph.D.  
Chief a.i.  
Digital Knowledge Hub Department  
BDT/ITU*

# Agenda

- I. Broadband (VHCN): Stats & Trends**
- II. Broadband (VHCN): Opportunities & Challenges**
- III. ICT Policy & Regulation in Digital Era**
- IV. Broadband (VHCN): Economic Analysis**
- V. ITU Initiatives, Products & Platforms**

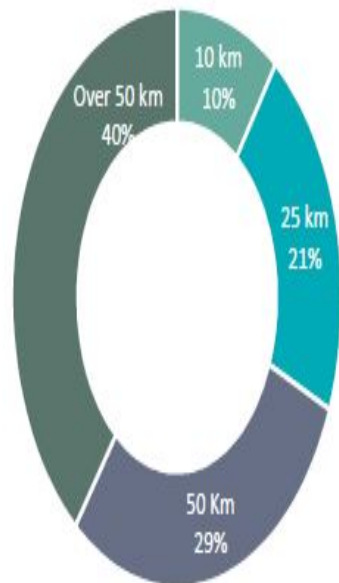
A world map with a yellow and orange color scheme, overlaid with a complex network of black lines representing global connectivity. Green dots are scattered across the map, likely indicating specific nodes or locations.

# **I. Broadband (VHCN): Stats & Trends**

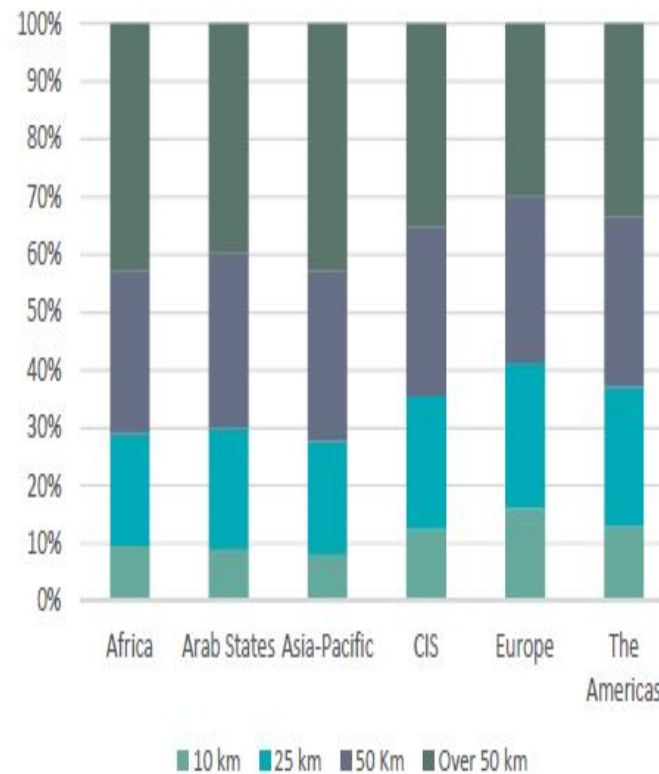
# ICT Infrastructure Trends (2018)

Fibre backbone connectivity, worldwide, 2018

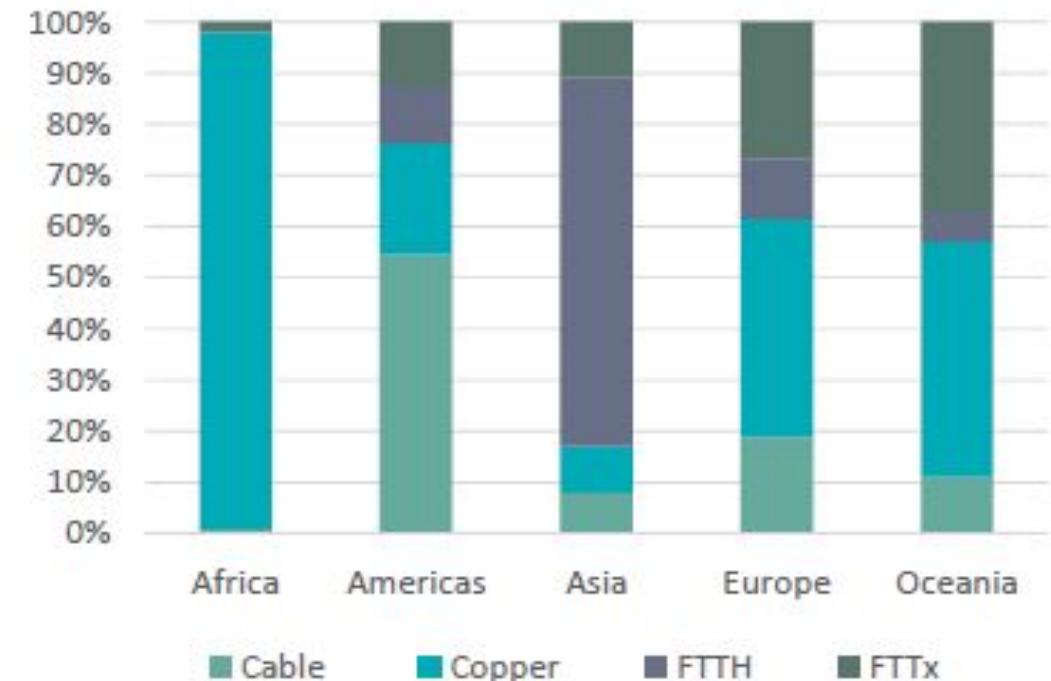
Population within reach of a fibre node



Status of backbone connectivity



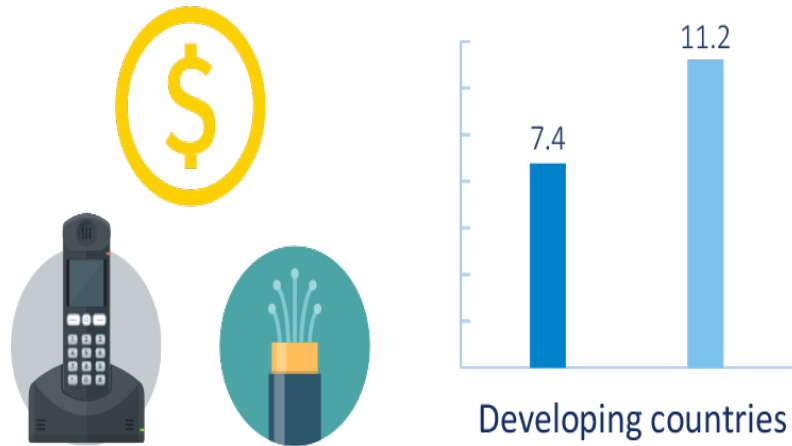
Technology market share by region,



Source: Point Topic

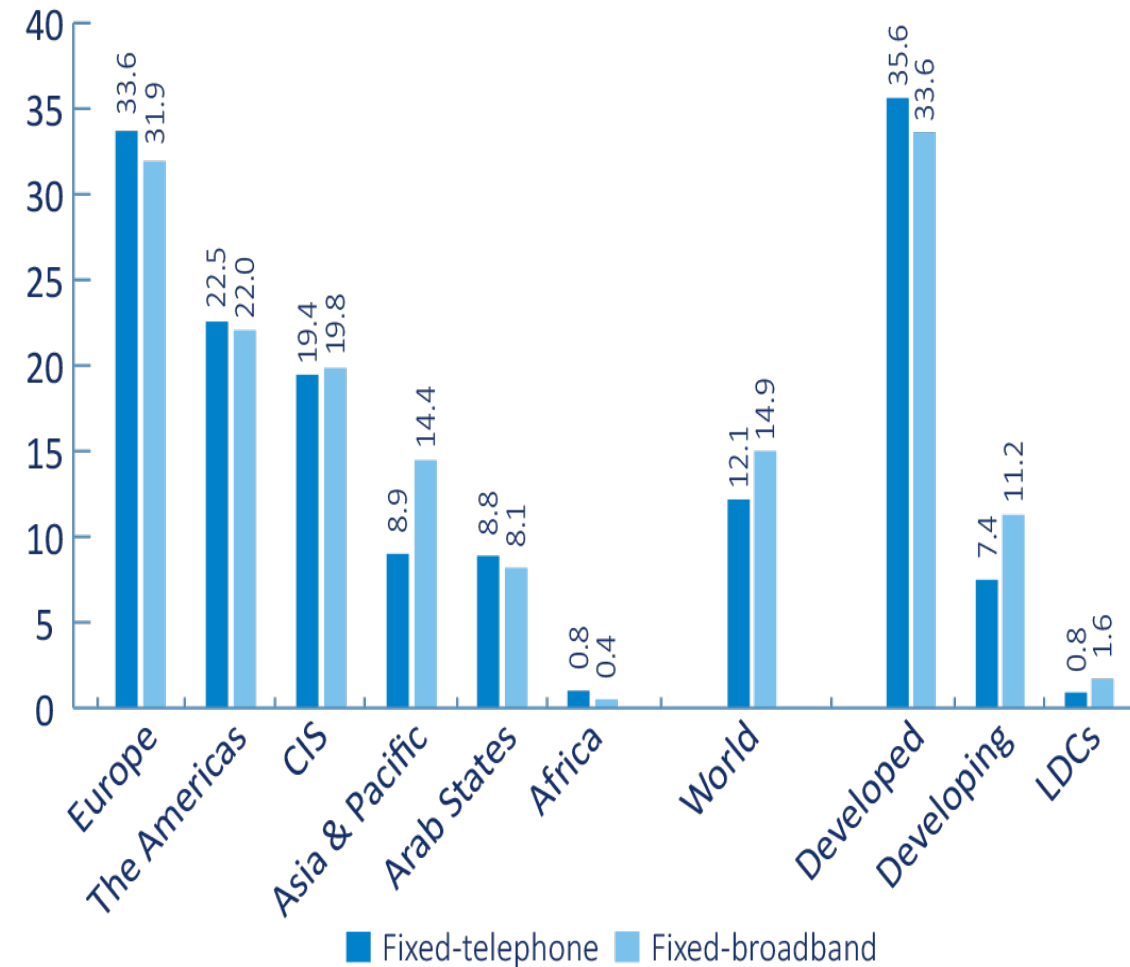


## Fixed-telephone and fixed-broadband subscriptions per 100 inhabitants, 2019\*



There is a strong correlation between a region's income levels and the number of fixed-telephone and fixed-broadband connections per 100 inhabitants, reflecting the price and availability of fixed connections.

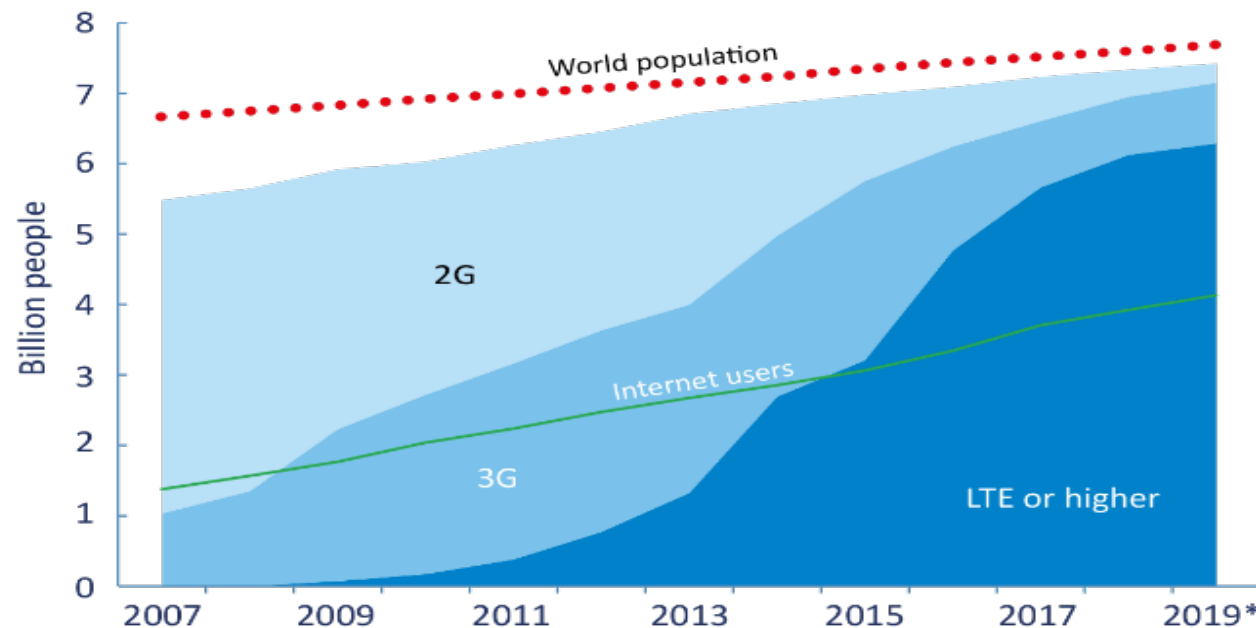
In developing countries, there are now more fixed-broadband than fixed-telephone subscriptions.



Note: \* ITU estimate. Source: ITU.

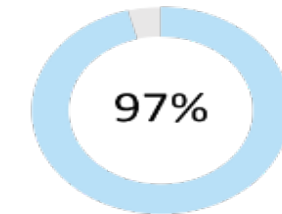
# Almost the entire world population lives within reach of a mobile network

*Mobile population coverage by type of network, 2007-2019\**

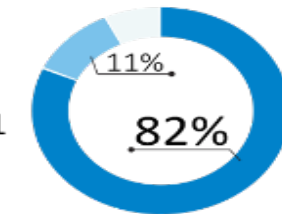


Note: \* ITU estimate. Source: ITU.

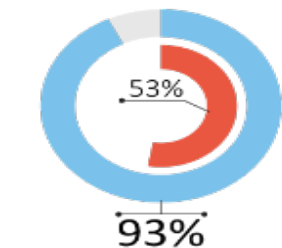
Almost the entire world population (97 per cent) lives within reach of a mobile cellular signal.



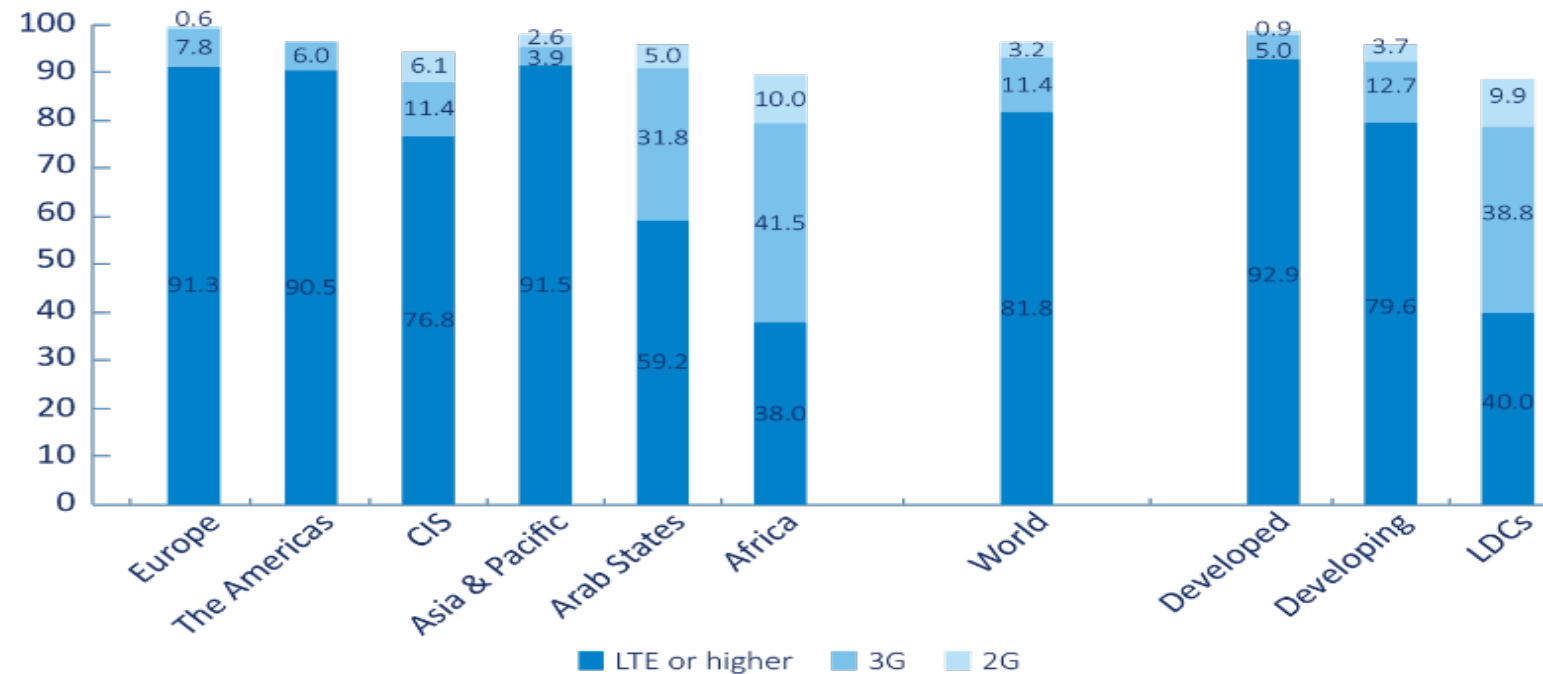
82 per cent of the world's population lives within reach of an LTE or higher mobile-broadband signal, and another 11 per cent have access to a 3G network.



While 93 per cent of the world's population lives within reach of a mobile broadband (or Internet) service, just over 53 per cent actually uses the Internet.



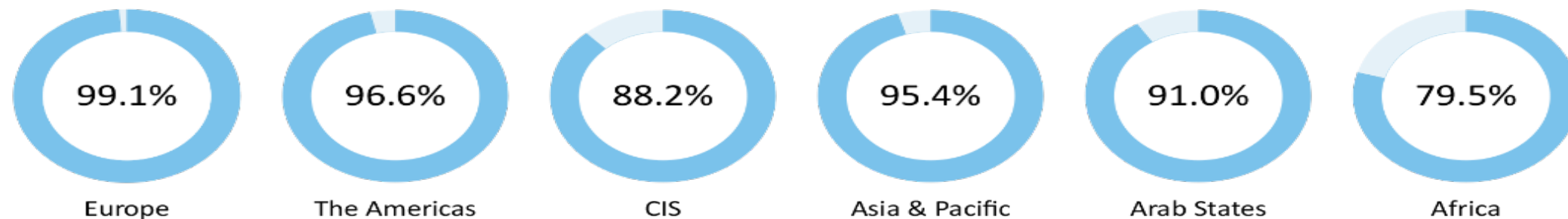
## Mobile coverage by type of network, by region and development status, 2019\*



More than 95 per cent of the population in Asia and the Pacific, Europe, and the Americas is covered by a 3G or higher network.

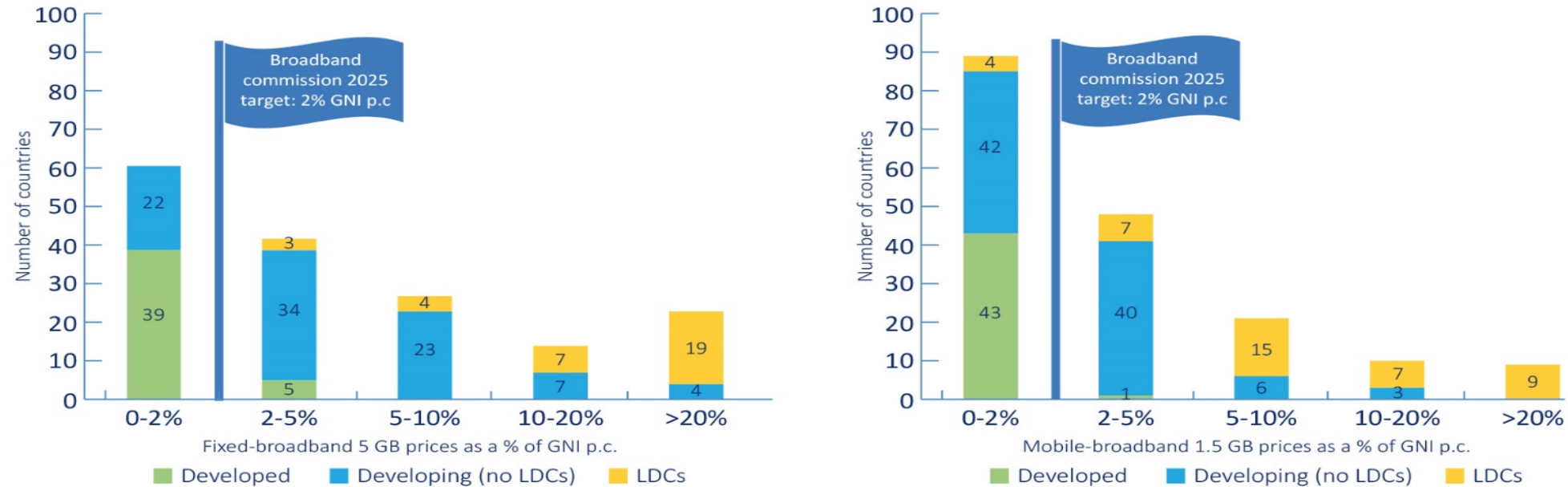
In the Arab States, 91 per cent of the population is covered by a 3G or higher network, while in the CIS region coverage is 88 per cent, followed by Africa at 79 per cent.

Note: \* ITU estimate. Source: ITU.



## Broadband still expensive in LDCs

*Broadband prices as a percentage of GNI p.c., 2019*



Note: Data thresholds are based on the ITU price baskets (see <https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx>). Source: ITU.

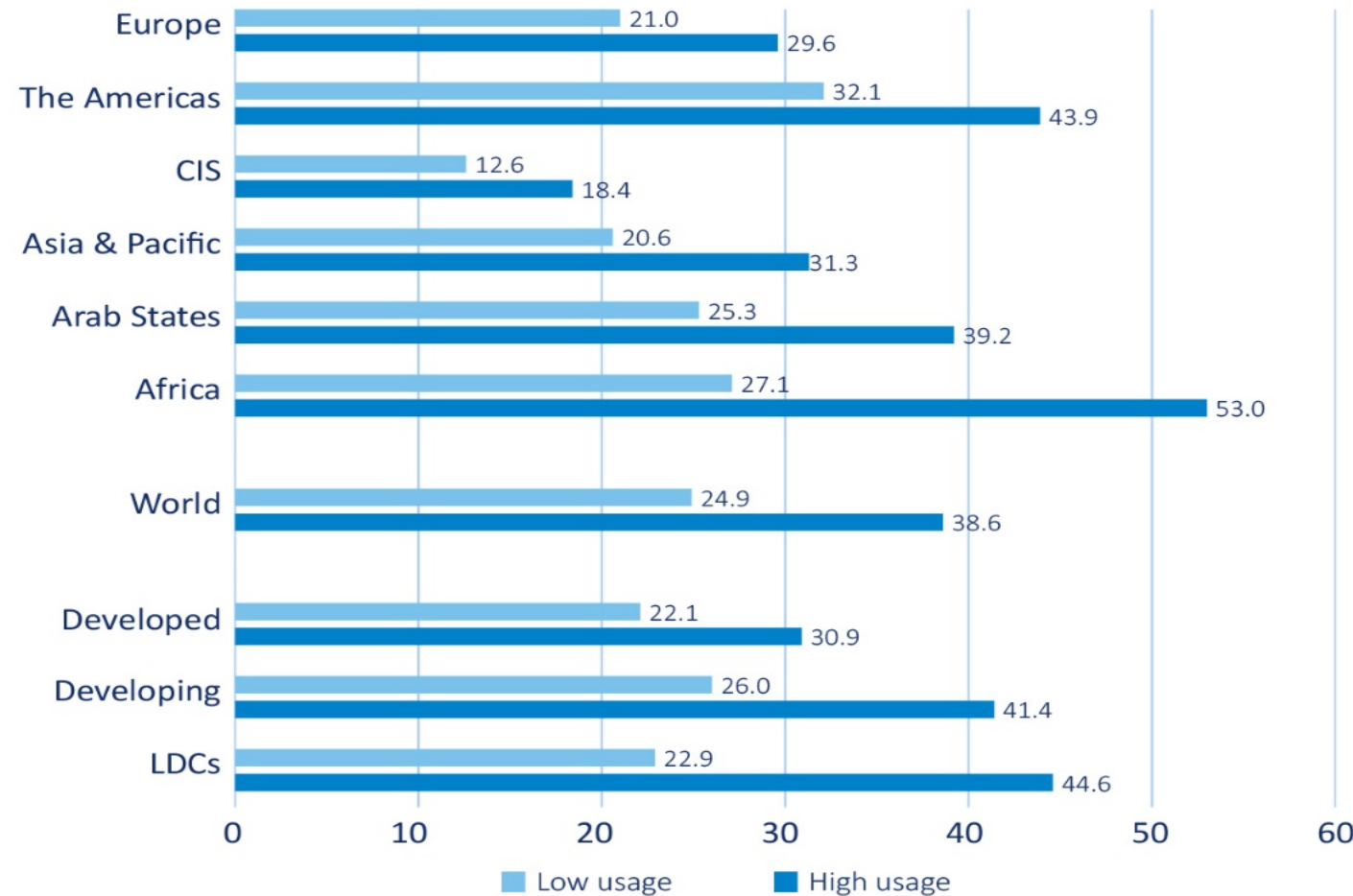
In 2018, the Broadband Commission for Sustainable Development set as a target for 2025 that entry-level broadband services should be made affordable in developing countries, corresponding to less than 2 per cent of monthly Gross National Income (GNI) per capita.

In 2019, in 61 countries, a fixed-broadband subscription including 5 GB of data costs less than 2 per cent of GNI per capita.

A mobile-broadband subscription with a 1.5 GB data package costs less than 2 per cent of GNI per capita in 89 countries, including four LDCs.

Although considerable progress has been made in recent years, affordability remains a challenge in many countries, especially LDCs.

## Bundled mobile broadband prices, PPP\$, 2019



A high-usage mobile broadband bundle, which includes 140 minutes of voice, 70 SMS and 1.5 GB of data, costs on average just under USD 40 in purchasing power parity (PPP) terms, although there is a significant difference between developed countries (31 PPP\$) and LDCs (45 PPP\$).

A low-usage bundle of 70 minutes of voice, 20 SMS and 500 MB of data has an average price of 25 PPP\$, with very little difference between developed countries, developing countries and LDCs.

The CIS region has the lowest prices, while in Africa mobile broadband bundles are the most expensive.

Note: Simple averages, based on the economies for which data on mobile-broadband prices were available. High usage refers to a bundle including 140 minutes of voice, 70 SMS, and 1.5 GB of data. Low usage refers to a bundle including 70 minutes of voice, 20 SMS, and 500 MB of data.

Source: ITU.



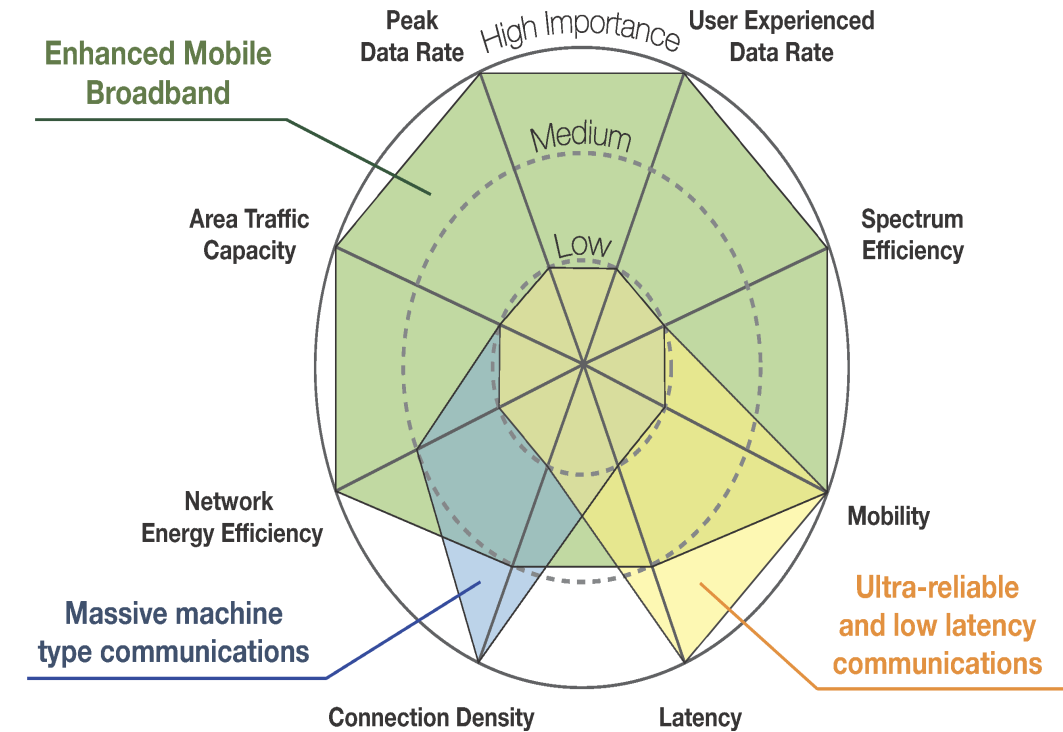
A world map with a yellow and orange color scheme, overlaid with a complex network of black lines representing global connectivity. Green dots are scattered across the map, likely representing specific nodes or locations.

## **II. Broadband (VHCN): Opportunities & Challenges**

# Broadband: 5G/IMT 2020

## *Enhanced Impacts in Digital Economy*

- Contributing to ***economic growth*** in GDP with potential beneficiary sectors: e.g., manufacturing, automobile, finance, media, healthcare, transportation, distribution agriculture etc. in digital ecosystem.
- Better & faster ***data rates*** for more efficient/transparent decision-making.
- Facilitating development and evolution of digital technology.
- Boosting ***labour productivity***.
- Resulting in a ***net gain in jobs*** (especially creative/innovative jobs) ...



Source: ITU

# Broadband: 5G/IMT 2020

## *Enhances Services in Digital Ecosystem*

Connecting the Unconnected

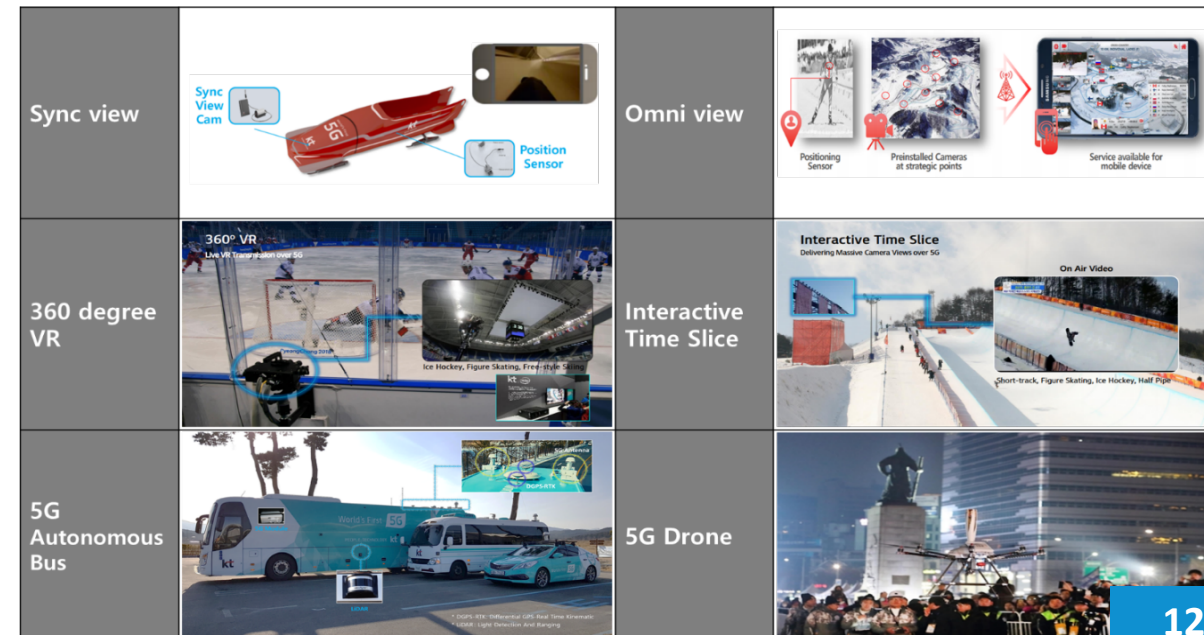
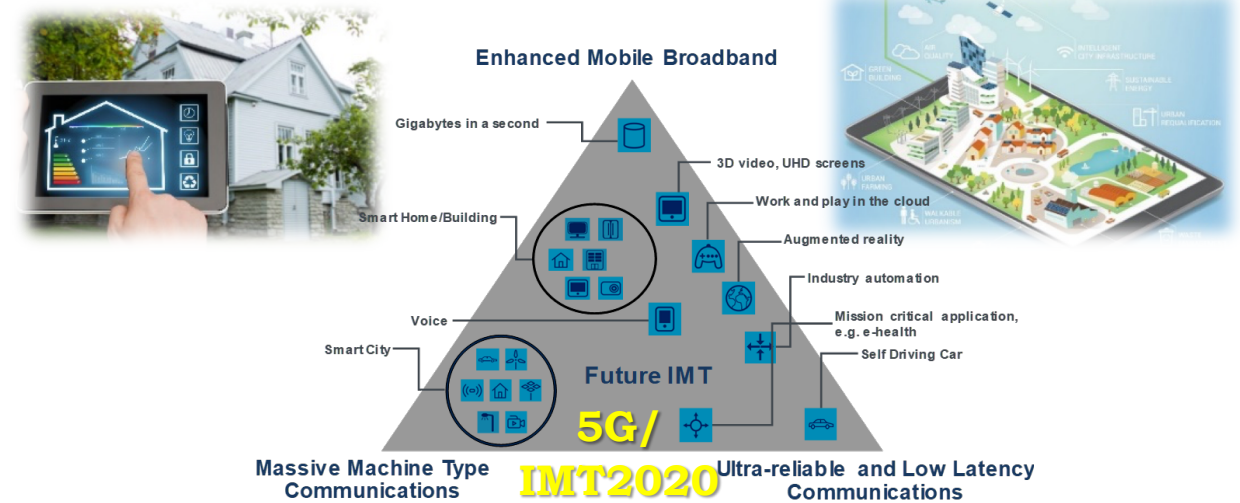


Source: ITU

### Diverse usage scenarios & applications:

- *enhanced mobile broadband* (eMBB),
- *massive machine-type communications* (mMTC)
- *ultrareliable and low-latency communications* (URLLC)

- ✓ Connected Cars, Intelligent Traffic Systems, Automatic Driving/Drones.
- ✓ Smart Sustainable City / Village / Community / Islands with IoT.
- ✓ e/m-health, e/m-education and e-farming with Virtual Reality and Augmented Reality.
- ✓ Waste/water management, early warning and disaster relief.





# 5G/IMT-2020: Post-WRC 19

## WRC-19 results:

- 5 bands between 24.25 and 71 GHz were identified for IMT.
- *Totally 17.25 GHz bandwidth spectrum* in comparison with 1.9 GHz available before WRC-19.
- Need to protect other services (e.g. Earth-exploration satellite service, space research service)

Identified for IMT (BW) [GHz]	Region 1 [Countries]	Region 2 [Countries]	Region 3 [Countries]
24.25-27.5 (3.25)	All	All	All
37-43.5 (6.5)	All	All	All
45.5-47 (1.5)	50	1	2
47.2-48.2 (1.0)	62	All	7
66-71 (5.0)	All	All	All

No change for [GHz]:  
31.8-33.4, 47-47.2, 48.2-  
50.2, 50.4-52.6, 71-76, 81-86

## *Socio-economic implications*

Despite the potential socio-economic benefits,  
***return on investment*** in 5G is challenging in fast evolving digital technologies.

*“Given the significant amount of investment that will be required to be made by operators in deploying 5G networks, there is scepticism among some operators over the hype that 5G has caused and over how they are supposed to make money from it.”\*<sub>1</sub>*

\*<sub>1</sub> <https://www.techradar.com/news/eu-backed-groups-warns-about-5g-claims>

*“Need for more investment in developing **5G repeaters and small cells** to improve indoor coverage”.\*<sub>2</sub>*

\*<sub>2</sub> Lesson learned from R.O.Korea after 5G trial in rural areas at ITU-D RGM 2019 Q5/1 contribution

**Challenges of *policy, regulation* .. !**

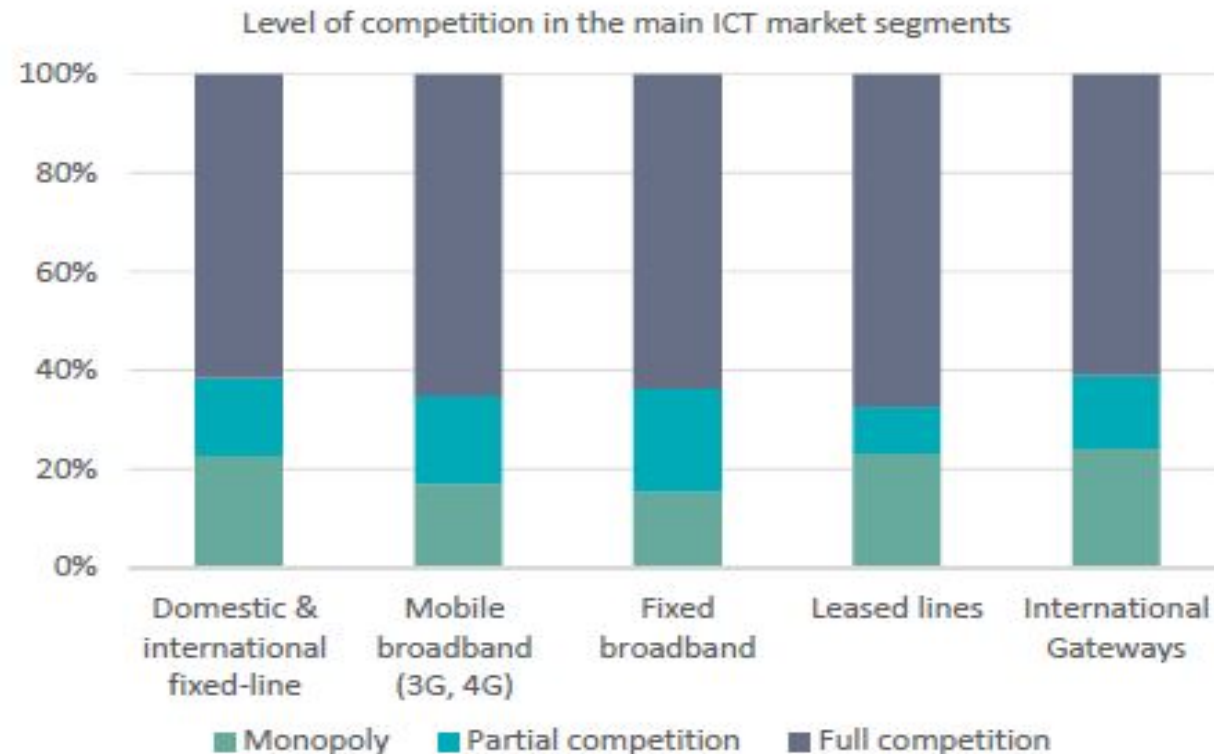


A world map is shown on the left side of the slide, with a network of lines (representing ICT infrastructure) overlaid on it. The map is colored in shades of yellow and orange, and the network lines are in various colors (red, green, blue).

## **III. ICT Policy & Regulations in Digital Era**

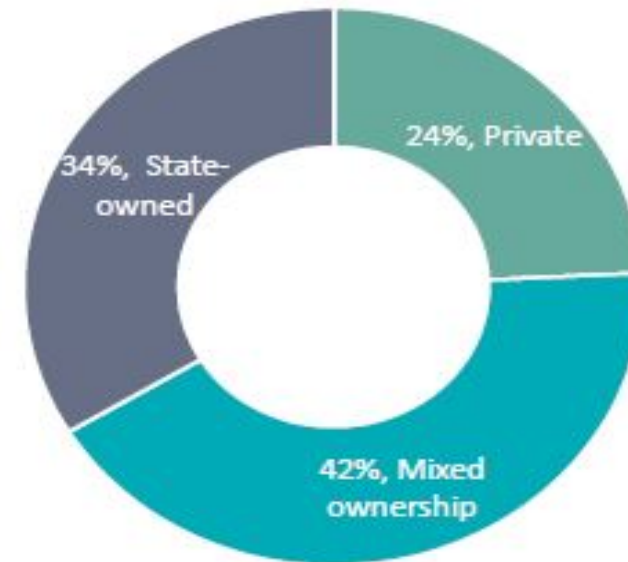
# ICT Market Structure: Monopoly Vs Competition

Figure 25: ICT market structure, worldwide, 2017



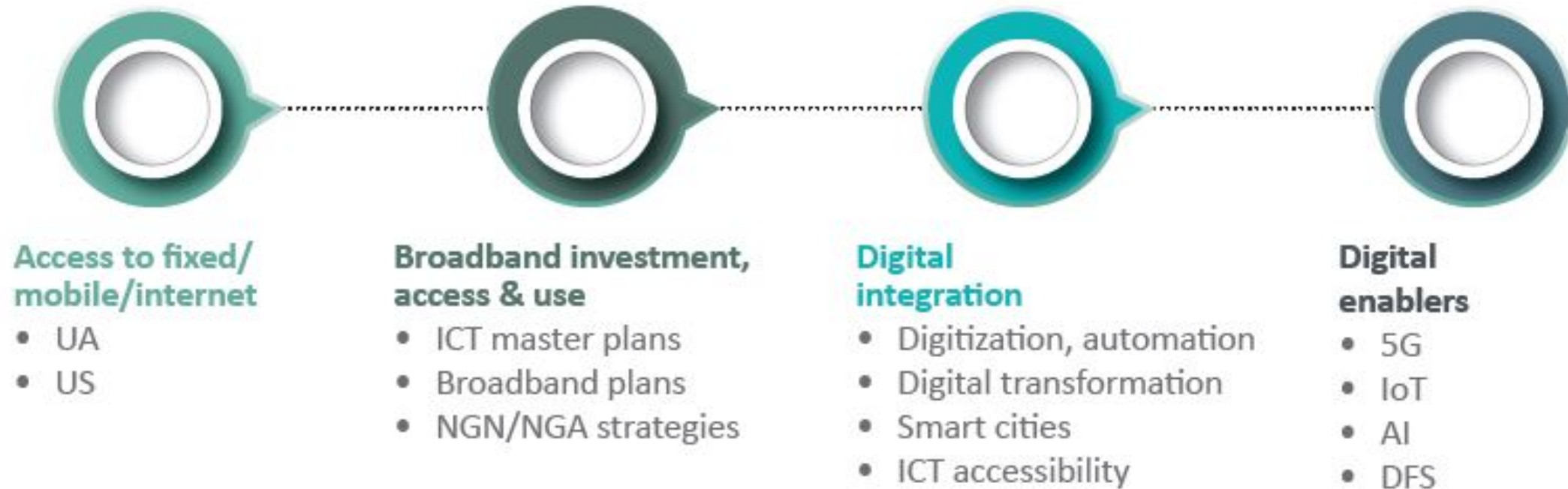
Source: ITU

Ownership of the fixed-line incumbent



# Evolution of ICT Policies

## Changing focus of ICT policies

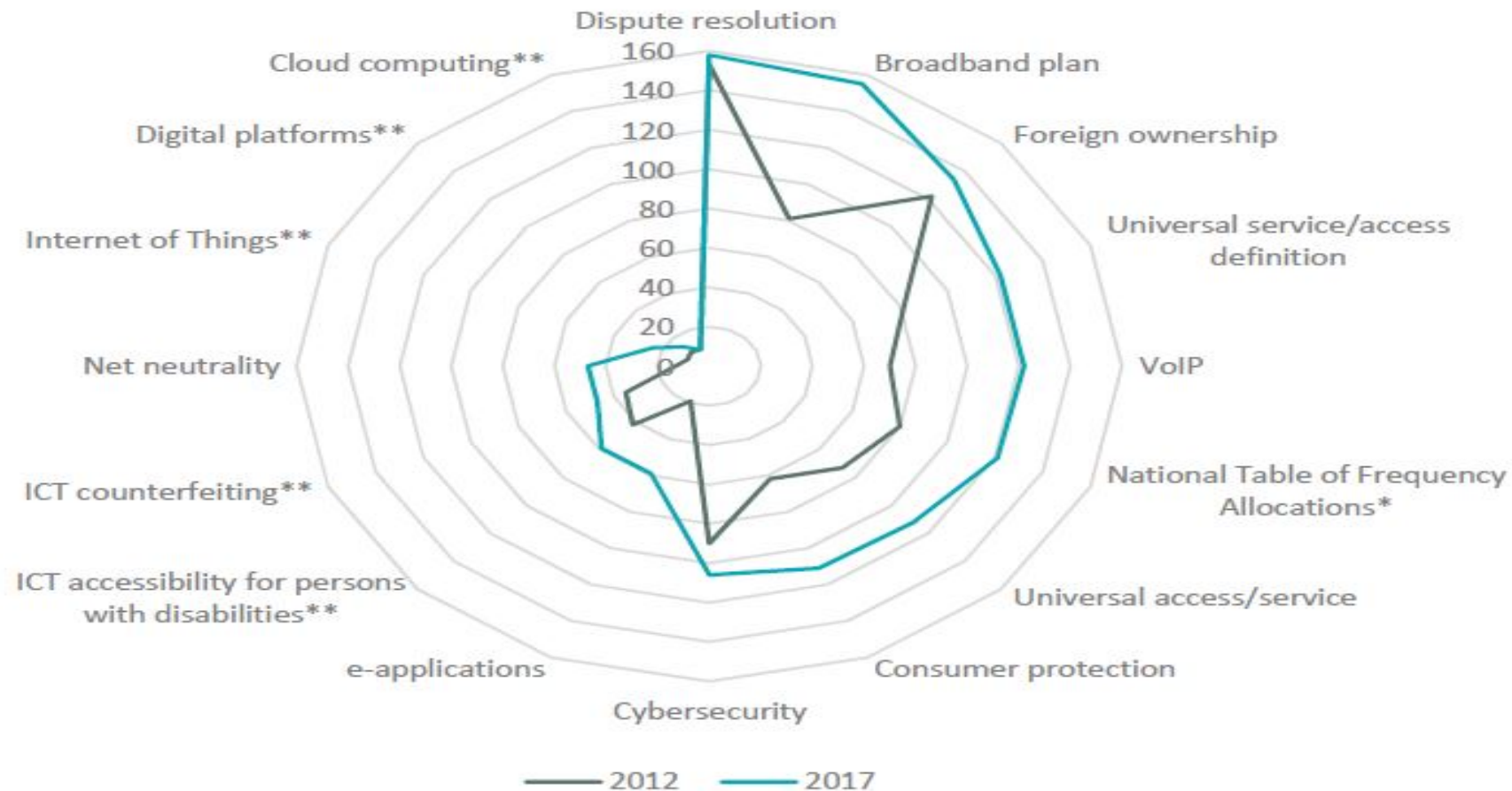


Note: UA = Universal access; US = Universal service; NGN/NGA = Next generation networks/ access; IoT = Internet of things; AI = Artificial intelligence; DFS = Digital financial inclusion

Source: ITU

# Evolution of ICT Policy & Regulatory Frameworks

Figure 22: Recent evolution of policy and regulatory frameworks, worldwide, 2012-2017



Note: \*2013 instead of 2012 data; \*\*2015 instead of 2012 data  
Source: ITU

# How to achieve sustainable digital transformation\* ?

**ICT policy and regulation** should be more holistic and be:

- **Cross-sectoral collaboration** based → New forms of collaborative regulation based on common goals such as social and economic good, and innovation.
- **Consultation and collaboration** based → Regulatory decision making should include the expectations, ideas and expertise of all market stakeholders, market players, academia, civil society, consumer associations, data scientists, end-users , and relevant government agencies from different sectors.
- **Evidence-based** → Appropriate authoritative benchmarks and metrics can guide regulators in rule-making and enforcement, enhancing the quality of regulatory decisions and their impact.
- **Outcome-based** → The rationale for any regulatory response to new technologies should be grounded in the impact on consumers, societies, market players and investment flows as well as on national development as a whole.
- **Incentive-based** → Regulators should keep a wide array of investment incentives at hand to provide impetus for markets to innovate and transform while maximizing benefits to consumers.
- **Adaptive, balanced and fit for purpose** → Regulation-making is about flexibility – continually improving, refining, and adjusting regulatory practices.
- **Focus on building trust and engagement** → Collaborative regulation provides the space for co-creating win-win propositions, working towards regulatory objectives while increasing the engagement of industry.

\* Based on the **GSR Best practice Guidelines** 2019



# Which **regulatory tools & approaches** are required for enabling a sustainable digital transformation?\*

## **Pro-competition frameworks for the digital transformation**

should consider longer value chains, more diverse market players, services and devices, stakeholder partnerships and digital infrastructure layers, and ultimately, their impact on markets and consumers

## **Regulatory incentives and stakeholder engagement**

create a positive market dynamic and improve market outcomes with less regulatory effort. Stakeholders engagement such as public hearings and expert workshops and roundtables can allow pooling resources and expertise to inform major regulatory decisions

## **Robust and enforceable mechanisms for consumer protection**

including a set of rules on data protection, privacy and data portability

## **Market-based and dynamic mechanisms for spectrum management**

can allow for flexible, simplified and transparent use of scarce radio frequencies, also promoting technology neutrality

## **Regulatory Impact Assessment (RIA) and dynamic collaboration among regulatory authorities**

as a regular practice before major regulatory decisions are made and throughout the lifecycle of regulation. Effective collaboration channels with other regulatory authorities are necessary to ensure coherent and reasonable regulations across economic sectors

## **Regional and international cooperation in defining regulatory rules on cross-border issues**

can ensure **consistency, predictability and fluidity** of digital markets

## **Regulatory expertise needs to be developed continuously**

to integrate **new technologies, competencies and skills** and allow for **data and evidence-based decision-making**.

# Investment & new business models for connectivity & competition @ GSR 19

- **Main drivers of investment** in digital markets: *spectrum, tax, competition policy & regulation*.
- Balancing **incentives** for greater infrastructure investment with **obligations** to connect the unconnected is necessary to unlock market potential.
- Right enabling environment with **stability, certainty and efficiency** for increasing **investor confidence**.
- Different or diverse **financing mechanisms** are required from **Universal Service Funds** to **reverse subsidies\***, while the role of the **private sector** is key.
- **New business areas/models**: e.g., digital financial services (DFS) in Africa has generated significant revenues for telecommunication operators and turned previously uneconomic areas into viable markets as demand increased.
- **New and emerging technologies**: e.g., Artificial Intelligence (AI) or Drones to offer more cost-effective solutions to infrastructure development (i.e., the network construction phase to reduce costs).
- **Collaboration** between operators, manufacturers and technology providers contributes to a more effective use of **very high capacity networks (VHCN)**.
- **Collaboration** with **municipalities and ministries responsible for land and urban development** will be needed since licenses or authorizations for the **use of public land or rights of way** are often required for infrastructure rollout.

\* consumer pays an upfront costs

# Voice of Private Industry in Digital Era @ GSR 19



## 10<sup>th</sup> CRO OUTCOME STATEMENT

9 July 2019, Port Vila, Vanuatu

*New collaborative approaches are needed to connect those who are still not able to benefit from the digital revolution, including a broader engagement of the public sector.*

*Financing of infrastructure expansion for, and enabling adoption by, all of the remaining 49% requires concerted efforts from all stakeholders of the ecosystem.*

*As such, the policy and regulatory environment has to provide the right incentives to ensure that inclusivity can be achieved commercially in a sustainable way.*

*In areas that are uneconomical, the right balance has to be struck between regulation, public sector involvement and competitive market forces.*

ITU GSR  
PORT VILA 2019  
9-12 July  
Port Vila, Vanuatu

A world map with a network of lines and green dots overlaid, representing a global communication network.

## IV. Broadband (VHCN): Econometric Analysis

***ITU: “Econometric analysis of  
the contribution of broadband,  
digitization and ICT regulation”***



# Case Study: “*The Economic Contribution of Broadband, Digitization & ICT Regulations*”

- In the age of digital transformation, ICTs are recognized as core enablers to economic and social development. This study builds on years of robust and reliable data resources with a global scope to measure the *impact of fixed and mobile broadband and digital transformation on the economy*, **digitization** as a whole, as well as the *impact of regulatory variables to the development of the digital ecosystem*.
- It **quantifies the impact** of broadband, digital transformation and the interplay of ICT regulation on national economies based on *new-generation, mature econometric modelling techniques*.
- This studies also brings the *effects of broadband* on countries at a different stage of development through using top-tier data metrics on the development of the digital ecosystem and the maturity of ICT regulatory frameworks: i.e., **Digital ecosystem development index and the ITU ICT Regulatory tracker**.





# Key Findings of the **Global Impact** Study

## Fixed Broadband

The impact of fixed broadband on GDP is *higher in more advanced economies* than in emerging countries (“return to scale” effect)

## Mobile Broadband

The impact of mobile broadband on GDP is *higher in less developed countries* than in more developed ones (“saturation” effect)

## Digitization

The impact of the digital ecosystem on *more advanced economies* is higher than in developing countries (“return to scale” effect)

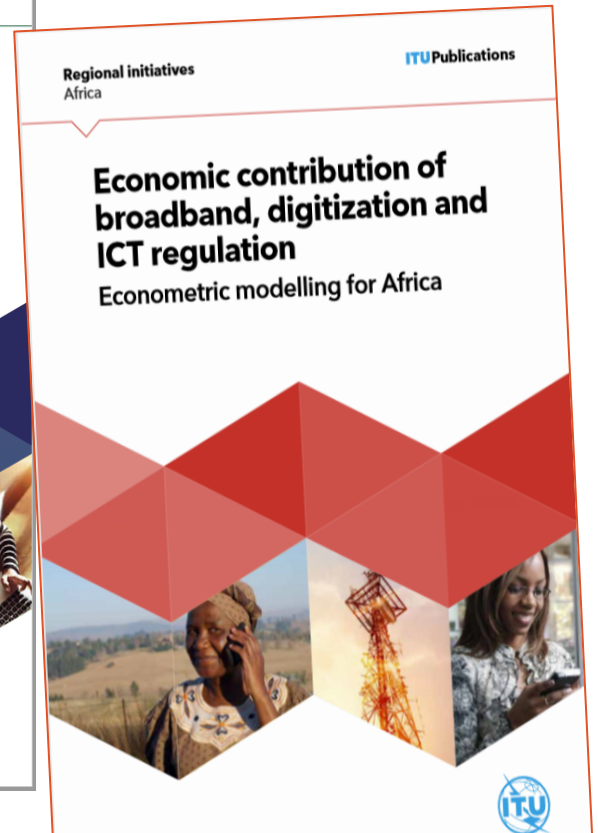
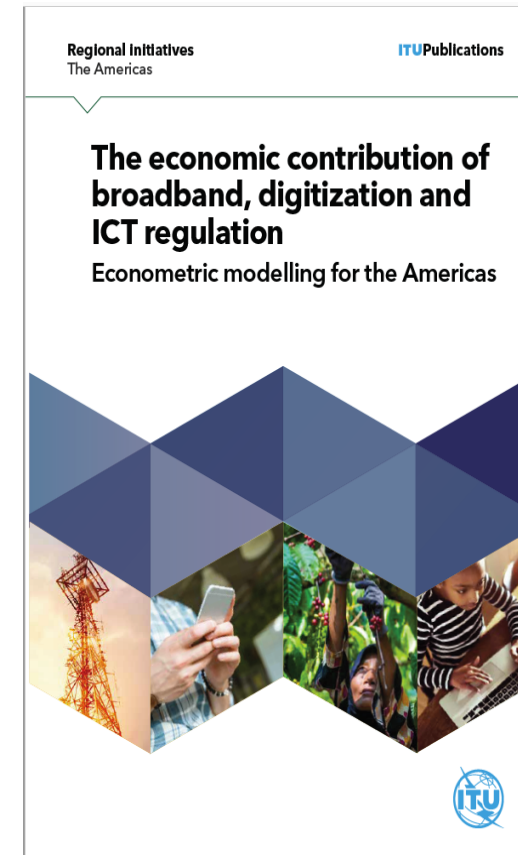
## ICT Policies & Regulations

The ICT regulatory and policy framework has a consistent *impact on the development of digitization*, regardless of the country’s level of development

# A series of 2019 *Regional Econometric Modeling*:

- **Global, Africa & the Americas** are now available.
- The Europe\* & other regions will be published soon !

## “The economic contribution of broadband, digitalization and ICT regulation”



<https://www.itu.int/pub/D-PREF-EF/en>

The countries included in this analysis are as per the ITU country classification:  
Albania, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, North Macedonia, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.\*

# Comparison of Key Findings: Global Vs **Europe**

## GLOBAL

## EUROPE

### Fixed Broadband

The impact of fixed broadband on GDP is higher in more advanced economies than in emerging countries (“return to scale” effect)

The GDP contribution of fixed broadband in high income European countries **increases to 2.94% for an increase of 10% in fixed broadband penetration**. Conversely, the impact of low-income country is not statistically significant (therefore, equal to zero).

### Mobile Broadband

The impact of mobile broadband on GDP is higher in less developed countries economies than in more developed ones (“saturation” effect)

An **increase of 10% in mobile broadband penetration yields an increase in 2.10 % in GDP per capita**, which implies that, in the aggregate, this technology has had a significant economic impact in Europe during the last seven years (2011-2018).

### Digitization

The impact of the digital ecosystem on more advanced economies is higher than in developing countries

An increase of 10% in the CAF Digital Ecosystem Development Index results in a 1.36% growth in GDP per capita. Therefore, an increase in the CAF Index from 50 to 51 will yield an **increase of per capita GDP of 0.27% for European countries**

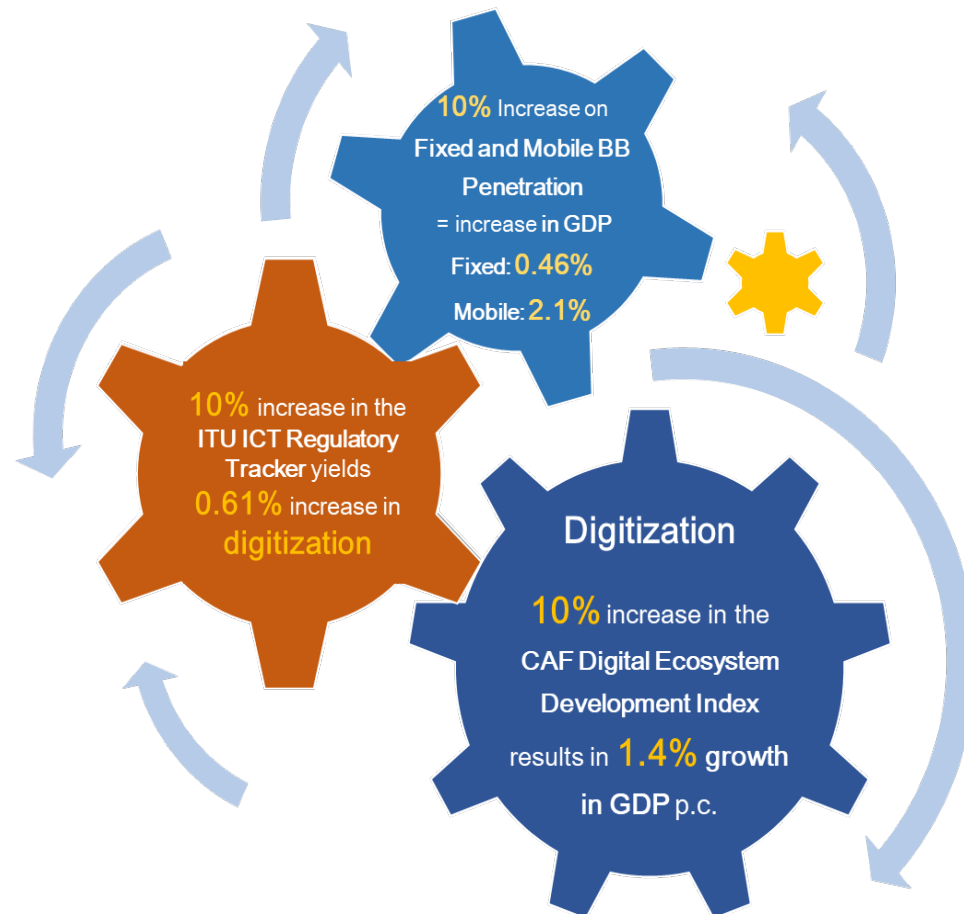
### ICT Policies & Regulations

The ICT regulatory and policy framework has a consistent impact on the development of digitization, regardless of the country’s level of development

An increase of 10% in the ITU ICT Regulatory Tracker yields a **positive increase in the CAF Digital Ecosystem Development Index of 0.613 %** in the subsequent time period for European countries

# Positive Economic Contribution of Broadband & ICT Policy & Regulations in Digital Era

Europe: Economic Impact of Fixed and Mobile Broadband and Digitization, 2019



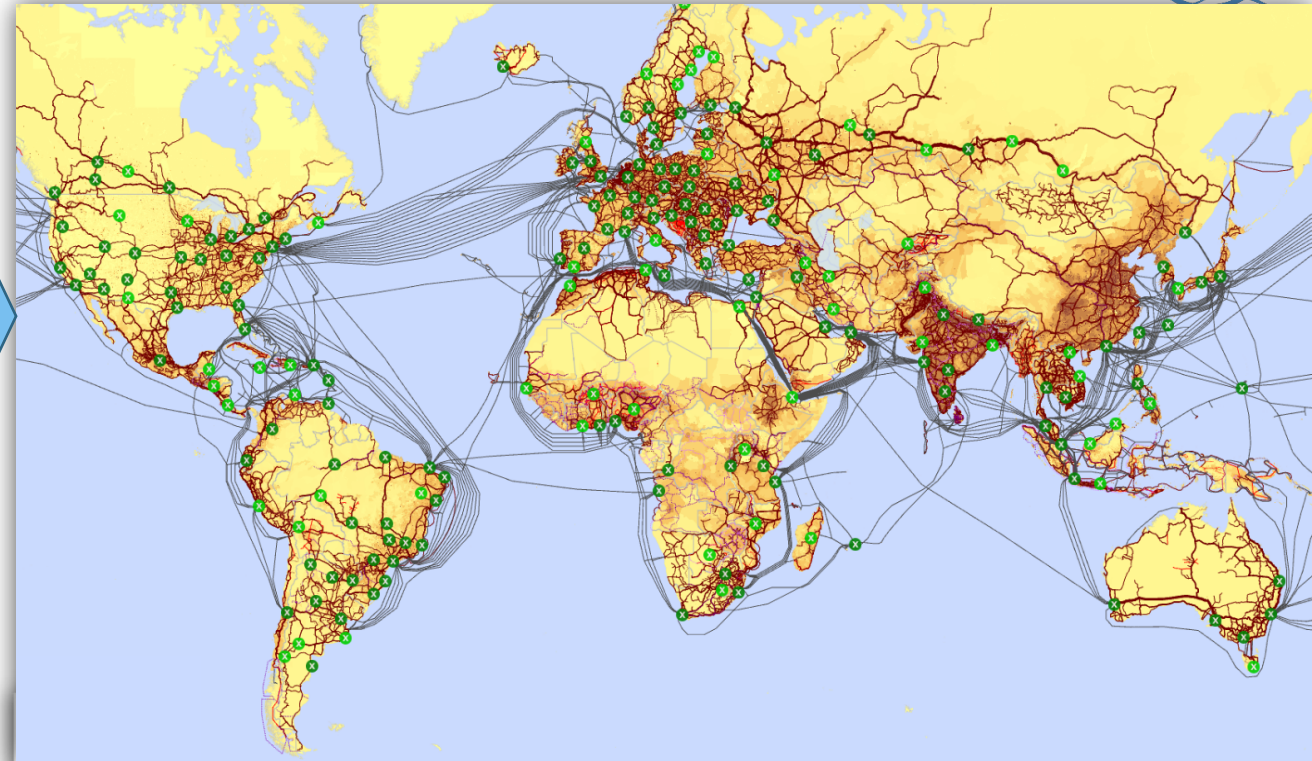
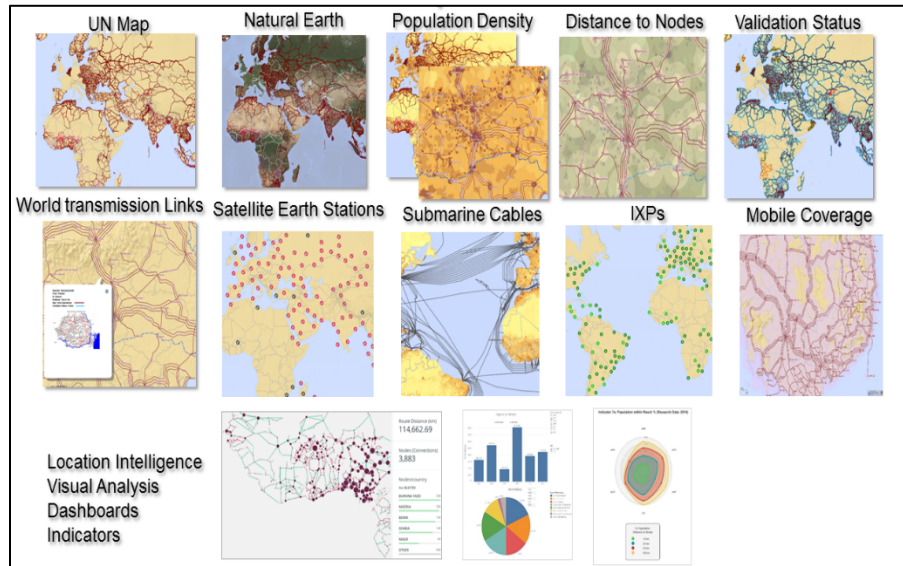
- This ITU report suggests that an increase of 10 % in mobile broadband penetration in Europe region would yield an increase in **2.10 % in GDP per capita**.
- The impact of policy and regulatory frameworks on the development of digitization was also tested.
- Importantly, in the case of Europe, the results also validated ***the positive impact of the ICT policy and regulatory component*** in the countries in the region.
- It was noted that an increase of 10 % in the ITU ICT Regulatory Tracker yields a positive increase in the CAF Digital Ecosystem Development Index of 0.61 % in the European countries.

A world map with a yellow and orange color scheme, overlaid with a complex network of black lines representing global connectivity. Green dots are scattered across the map, likely indicating specific nodes or locations.

## V. ITU Initiatives, Products & Platforms



# ITU Interactive Transmission & Broadband Maps



- Countries covered: 164
- Total of Km drawn: 3,661,203
- Number of Nodes: 23,807
- Number of Transmission lines: 37,283

Operators:

Region	Terrestrial
Africa	93
Arab States	40
Asia & Pacific	94
CIS	26
Europe	141
The Americas	108
<b>Total</b>	<b>512</b>

- Analyze ICT Infrastructure Gap
- Identify investment
- Partner with other stakeholders

<https://itu.int/go/map-public>

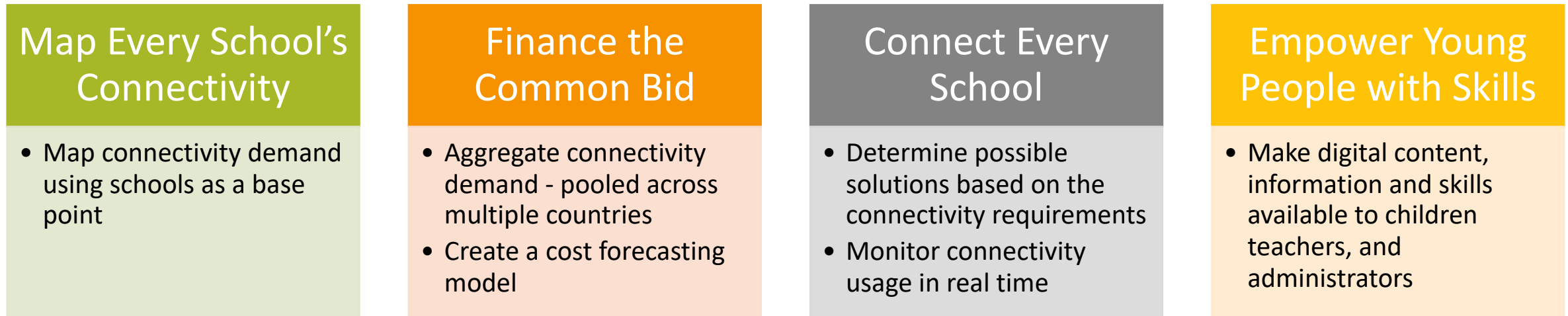


# Partnership among UNICEF-ITU GIGA

## (A “GAVI” for Gigabytes)

- Providing connectivity to the world remains a challenge
  - Nearly 3.7 billion people remain unconnected from the internet
  - 29% of 18-24 year-olds, most of them in Sub-Saharan Africa, do not have digital access
- GIGA: UNICEF-ITU new initiative to *connect every school to the internet*, and every young person to information, opportunity, and choice

### ➤ *GIGA’s 4 pillars*



- Initial efforts on East Africa, Central Asia and Eastern Caribbean (with first bid in September 2020)

For more information, see [www.giga.partners](http://www.giga.partners)

# Broadband & Policy @ ITU-D Study

Connecting the Unconnected



Study Question	Links with 5G
Q1/1: Strategies and policies for the deployment of <b>broadband</b> in developing countries	<ul style="list-style-type: none"><li>• Policies and regulations that promote increased <b>high-speed, high-quality broadband network connectivity</b> in developing countries.</li><li>• Guidelines for making the transition from narrowband to high-speed, high-quality broadband networks (<b>including transition to 5G/IMT-2020 networks</b>), (...)</li></ul>
Q5/1: Telecommunications/information and communication technologies for rural and remote areas	<ul style="list-style-type: none"><li>• Techniques and sustainable solutions that can impact on the provision of telecommunications/ICTs in rural and remote areas, <b>with emphasis on those that employ the latest technologies</b> (e.g., <b>5G/IMT 2020...</b>)</li><li>• Identifying the <b>rapid change of technologies which could be utilized in rural and remote areas</b> should be taken into account.</li></ul>
Q1/2: Creating smart cities and society: Employing information and communication technologies for sustainable social and economic development	<ul style="list-style-type: none"><li>• <b>Case studies on the application of IoT</b>, communications and ICT applications in building SSCs (smart cities and communities), (...)</li></ul>
Q7/2: Telecommunications/ICTs for eHealth	<ul style="list-style-type: none"><li>• Compilation and analysis of the regulatory policies concerning <b>human exposure to EMF that are being considered or implemented for authorizing the installation of radiocommunication sites</b>.</li></ul>

# ITU-D: Research, Publications & Portals on ICT policy & regulation

Connecting the Unconnected

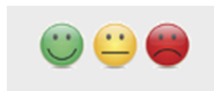


- **Cutting-edge research and publications** focusing on best practice **ICT policy & regulation** to enable digital transformation



- **Thematic Portals** on the Digital Ecosystem, Infrastructure development and sharing, International Mobile Roaming Portal, Quality of Service Regulation

Quality of Service  
(QoS) Regulation



ITU Digital Ecosystem Portal



*"To meet the expectations of a rapidly evolving digital ecosystem, policy makers and regulators need to adopt and develop more flexible, innovative and light-handed regulatory frameworks expanding beyond the traditional core telecom sector to take into account the multi-facet and multi-stakeholder dimensions of the digital world."*  
Mr Brahima Sanou, Director,  
ITU Telecommunication Development Bureau (BDT)

ITU Infrastructure  
Development Portal





# ITU Academy Platform

## ITU Academy Platform

- ITU Academy as a capacity building initiative serves our members & partners (government, private industry, & academia) to share *expertise, resources and capacity building know-how* across the world
- Some **30 Centers of Excellence** with partners for both face-to-face and online courses
- Offers general and specialized courses on all aspects of the *digital skills development*
- Topics include: *innovation and entrepreneurship, digital inclusion, Internet of Things, cybersecurity* and many others
- Leading platform of all ITU *capacity development* activities
- It responds to a growing demand for *ICT training, teaching and research*





ITUEvents

## 2nd ITU-Academia Partnership Meeting

*Developing skills for the digital era*

2-3 December 2019  
Georgia Tech  
Atlanta, United States

[www.itu.int/csd-academia2019](http://www.itu.int/csd-academia2019)



Georgia  
Tech



**Presentations at:**

<https://www.itu.int/en/ITU-D/Capacity-Building/Pages/events/2019/programme.aspx>



## Welcome to the Next ITU Academia Partnership Meeting

Where: Beijing, China

Who/Host: Tsinghua University

When: Spring 2021

# Digital Skills *Insights* 2020

## Call for papers

### Digital Skills *Insights*

An ITU capacity  
development online  
publication



Includes scholarly  
articles with a focus  
on capacity building  
and skills  
development in the  
digital era



Targets specialists in  
the field of Digital  
technologies:  
researchers,  
innovators,  
academics, ITU  
specialists, students,  
policy makers.  
Among others



Call for abstracts  
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Issues covered:  
characteristics of  
future digital  
ecosystem, skills sets  
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training approaches  
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