

## Digital Connectivity Webinar Series

European Commission's Directorate-General for International Partnership (DG INTPA) Unit F5

22, 25, 26, and 27 of April 2022



Other housekeeping notes can be:

You are invited to turn on your camera when talking;

Please mute yourself when not talking;

Please signal via the chat if you would like to say something during the discussion; Please state your name, country and the institution/unit you work for.

Please note that, with your approval, the meeting will be recorded for internal purposes.

Or:

Please make sure:

You have a good internet connection and the webcam ON;

You keep next to you a good coffee and a bit of patience, sometimes technology is not perfect;

You have a notebook where to take notes;

You have your phone next to you (we might use it);

You have a headphone connected to your computer, the sound will be better.









## Tiago S. Prado

- 14 years experienced digital policy and regulatory consultant, with an extensive track record of work with governmental actors in EU, LATAM, Africa, as well as with international organizations (e.g. UN's ITU, OAS/CITEL) and development banks (e.g. IADB)
- Advanced analytical background, with a Master of Public Policy, an MBA focused on project management, a B. Eng. in Communications Networks, currently pursuing PhD studies in digital policy and economic issues
- Authored the <u>ICT Infrastructure Business Planning Toolkit</u>, published in 2019 as a reference of the United Nations on how to use business planning to enhance policymaking and regulation of telecom services
- Trained policymakers and regulators in Africa, EU and Latin American on how to use business planning as a tool to support evidence-based policy and regulatory decisions





### **Stephanie Zwier**

- She has **15 years** of work experience in the field of **Knowledge Management** for internationally operating NGOs, for the European Commission (e.g. Brussels Briefings), for the Dutch Ministry of Foreign Affairs and US Government. She is Dutch and has worked in the roles of **researcher**, **trainer**, **knowledge management expert and translator**.
- Stephanie Zwier holds a Master's and an Advanced Master's Degree on International Development Cooperation from the Dutch Radboud University. She has a strong background in the field of international collaboration, focusing on digital technologies, entrepreneurship, education, gender, food security and renewable energy. She also holds a first-year diploma and certificates in physics and renewable energy and has a keen interest in technology.
- Additionally, she has strong ICT skills, currently she manages the sales of self-developed bookkeeping software for entrepreneurs. She is currently improving her coding skills in four coding languages and attends courses on knowledge management and software development to keep her skills up to date.
- She enjoys working in multi-country collaborative knowledge sharing and organisational learning projects and is honoured to collaborate on this project as well.



# Overview of the Webinar Series

Introduction on Digitalization for international partnerships Implementation of Digital Connectivity Advantages and Disadvantages of Digital Connectivity Regulations, Case Study and Greening Digital Connectivity



Webinar 1: Introduction on digitalisation for international partnerships

Part 1: Introduction to Digitalisation: definitions and concepts, opportunities, and challenges of digital connectivity

Part 2: Introduction to Digitalisation: EU role and policy overview





Webinar 3: Advantages and Disadvantages of Digital Connectivity

Part 1: Benefits and risks of digital connectivity: the risks

Part 2: Benefits and risks of digital connectivity: the benefits



Webinar 4: Regulations, Case Study and Greening Digital Connectivity Part 1: Regulatory frameworks, supporting elements.

Part 1: Regulatory frameworks, supporting elements, and business environment

Part 2: Greening digital connectivity and data infrastructures





### Today's Webinar Outline:

Part 1: Introduction to Digitalisation: definitions and concepts, opportunities, and challenges of digital connectivity

- · From voice to virtual: concepts and references.
  - o Definitions, Redefinitions and Concepts in a mutable world.
- · Why digital connectivity matters? The multiplier effects of connectivity.
  - o Opportunities and challenges of digital connectivity.
- · Current status of digitalisation and the challenges of connecting the unconnected.

• Quiz 1: Which is the shape of Marginal Cost to connect the unconnected?

#### Part 2: Introduction to Digitalisation: EU role and policy overview.

- The Digital Global Gateway Initiative and other EU initiatives to promote digitalization.
- · EU role in relation to other international actors.
- · Digitalisation for sustainability and the implementation of the Green Deal.
- · Quiz 2: Advantages of the EU as a digital global gateway.



### Learning outcomes:

- · Understand the trends from voice to virtual communications;
- · Understand fundamental drivers of Digital Connectivity;
- · Recognize opportunities and challenges of digital connectivity;
- · Become aware of key characteristics of the world offline population;
- · Discuss the concept of marginal costs of connectivity universalization;
- Gain insight in the main EU initiatives and the rationale behind EU promotion of further digitalisation, with a focus on the Digital Global Gateway Initiative;
- Discuss the role of EU as a global player on digital connectivity compared to other international actors, as well as the broader value of digitalisation for sustainability and the implementation of the Green Deal.





# Part 1- Introduction to Digitalization

Definitions and concepts, opportunities, and challenges of digital connectivity

Tiago S. Prado





1. **Objectives and rational:** to present how the traditional telecommunication enabled a revolution in voice communications and to contrast it with the new multimedia technologies.

#### 2. References:

- Photo: people using public phone booth in Rio de Janeiro, 1998. (image available under creative commons license)
- https://unesdoc.unesco.org/ark:/48223/pf0000119200

- Waves of communications technologies affect industries and lifestyle.
- An enormous amount of the activity driving telecommunications has to do with the emergence of advanced applications; likewise, advances in telecommunications capabilities spur developments in computing platforms and capabilities. The two are intimately and forever intertwined.

## Telecommunications concept and the drivers of technology change

### What is telecommunication?

- Telecommunication encompasses the electrical communication at a distance of voice, data, and image information (The IEEE Standard Dictionary, Ref. 2)
- There are four basic types of medium commonly used to transport telecommunication signals: wire pair, coaxial cable, fiber optics, and radio

### From Voice to Data:

- The emergence and development of computers and smartphones pushed the telecom to new technology standards
- The telco industry used to be all about voice traffic. The reality has changed once Data is now the main usage (videos, SMS, chat, browsing the web...)
- Is the infrastructure development an enabler of new applications? Or, vice versa? Or both?



1. Objectives and rational: to introduce The state of telecommunication networks: from voice to data, 5G and beyond. This slide introduces the telecommunications network transition from a PSTN to a package based network. Some highlights on legacy networks and modern networks.

### 2. References:

- https://www.ericsson.com/en/reports-and-papers/white-papers/voice-and-video-calling-over-lte--securing-high-quality-communicationservices-over-ip-networks
- (book) Freeman, Roger L. 1999. Fundamentals of Telecommunications. John Wiley & Sons, Inc., ISBNs: 0471-29699-6.

- The telecommunication industry is evolving rapidly. In the 70's the switching board operators, precursory technology in telecommunications, were still needed, and the shift to the automated switching boards (PBX) was barely starting fifty years ago.
- The emergence and development of computers and smartphones pushed the telecommunication network to new technology standards and nowadays, mobile devices are forcing a significant change of infrastructure.
  - Causality: Is the infrastructure development an enabler of new applications? Or, vice versa? Or both?
- The telco industry used to be all about voice traffic. The reality has changed once Data is now the main usage (videos, SMS, chat, browsing the web...)
- Several drivers of change in infrastructure, devices and applications motivated the full transformation of the sector over the years.
- It also has effects in shaping consumers and industry behavior.

## Modern Networks and the emerging architecture

### (Modern) Next Generation Networks (NGN):

- packet-based network in which service-related functions are independent from underlying transportrelated technologies
- A single, convergent network infrastructure to carry traffic of all services

### (State of art) Software Defined Network (SDN):

- uses functional hardware infrastructure that can have its capacity and function adapted via software, avoiding costs with hardware replacement
- differs from traditional networks, which use dedicated hardware devices (i.e., routers and switches) to control network traffic. SDN can create and control a virtual network – or control a traditional hardware – via software



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- 1. Objectives and rational: to introduce a general architecture of Telecommunications network components. <u>This topic will be back to debate in the webinar 2, so that this introduction is just for introducing concepts.</u>
- 2. References:
- https://www.itu.int/en/ITU-D/Technology/Documents/LMC/ITU%20Last-Mile%20Internet%20Connectivity%20Solutions%20Guide%20-%20Slides.pdf
- 3. Notes:
- Not exhaustive, for illustrative purposes.
- Some segments are interchangeable, particularly in the last-mile. This mix of technology for last mile and even for the middle mile network plays a key role in connecting the unconnected in developing nations.
- The technologies listed for the last mile are not exhaustive.



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https://www.usaid.gov/sites/default/files/documents/15396/Barriers\_to\_Investing\_i n\_Last-Mile\_Connectivity.pdf

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Access network technology	Potential throughput / QoS	QoS Range	Capital expenditure to deploy new network	Infrastructure required	Access device type	
Fibre	100 – 1000 Mbit/s	100s of km	Overhead cabling: low to medium	Tower, poles, cabinets, active network equipment	Fibre modem to	
			Below ground: medium to high (new excavation)	Subterranean duct work, cabinets, active network equipment	Ethernet-enabled devices or to WiFi	
Coax (cable)	Up to 200 Mbit/s	Up to 100 km	Low to medium	Tower, poles, cabinets, active network equipment	Cable modem to Ethernet enabled devices or to Wi-F	
Copper	0 to 24 Mbit/s (for ADSL, ADSL 2, ADSL 2+); 100 Mbit/s (for VDSL, VDSL2, Vectoring); 1 Gbit/s (G.Fast)	0.1 to 5 km	Low to medium	Tower, poles, cabinets, active network equipment	Modem to Etherner enabled devices or t Wi-Fi	

- 1. **Objectives and rational:** to introduce some characteristics of WIRED access network Technologies.
- 2. References:
- https://www.itu.int/en/ITU-D/Technology/Documents/LMC/ITU%20Last-Mile%20Internet%20Connectivity%20Solutions%20Guide%20-%20Slides.pdf
- 3. Notes:
- These are reference parameters of common WIRED access network technologies.
- Performance may vary on the characteristics of the area and the regulatory demands.
  - <u>Amongst the regulatory issues are the civil construction requirements</u>. Pole attachment deployment and right of way are examples.
- The suitability to local implementation will also depend on socio economic conditions of the area.
  - For example, bellow ground deployment of fibre is not suitable for rural deployments. The overhead fibre cabling will also depend on purchasing power and population densities what reduces its suitability for rural areas as well.

Access	Potential	Pange	Capital expenditure to	Operating	Infrastructure	Access device
technology	QoS	Range	deploy new network	expenses	required	type
Wi-Fi	2 Mbit/s (a) to 10 Gbit/s (ax)	Up to 100m	Low	Low	Wi-Fi routers	Wi-Fi enabled smartphones, tablets computers
Mobile cellular (2G, 3G, 4G, 5G)	0.1 – 1000 Mbit/s	5 to 15 km	Medium to high	Medium to high	Towers and radio equipment	Cellular mobile phones, laptops, personal computers (via dongles)
Fixed wireless access (4G/ 5G)	20 – 1 000 Mbit/s	Up to 10 km	Low to medium	Low	Towers and radio equipment	Consumer premises modems to Etherne or Wi-Fi
Satellite (HTS GEO and MEO	5 – 150 Mbit/s	1000s of km	High (for new satellite deployment); low (for enduser terminals)	Low	Earth station, satellite, very- small-aperture terminal	Very-small-aperture terminal, consumer premises modems to Ethernet or Wi-Fi

- **1. Objectives and rational:** to introduce some characteristics of WIRELESS access network Technologies.
- 2. References:
- https://www.itu.int/en/ITU-D/Technology/Documents/LMC/ITU%20Last-Mile%20Internet%20Connectivity%20Solutions%20Guide%20-%20Slides.pdf
- 3. Notes:
- These are reference parameters of common WIRELESS access network technologies.
- Performance may vary on the characteristics of the area and the regulatory demands.
  - Amongst the regulatory issues are the spectrum licensing requirements.
    - While Wi-Fi: 802.11 does not require specific license but compliance with technical specifications via "blanket licence" under noninterference/non- protection regime, the mobile cellular need spectrum licenses.
- The suitability to local implementation will also depend on socio economic conditions of the area.
  - For example, the wi-fi needs a backhaul (satellite, microwave or fibre) while mobile and fixed wireless access depend on financial viability and demand.



https://www.usaid.gov/sites/default/files/documents/15396/Barriers\_to\_Investing\_i n\_Last-Mile\_Connectivity.pdf https://oefr.gu/publication/network\_offects\_ouropage\_digital\_sourceignt

https://ecfr.eu/publication/network-effects-europes-digital-sovereignt

https://www.oecd-ilibrary.org/docserver/5jz8m9jf3wkl-

en.pdf?expires=1648172109&id=id&accname=guest&checksum=0D279B35C2E05D7 546C315D9D28FE24Cy-in-the-mediterranean/

## Concepts' redefinition in a mutable world: new trends

IoT and virtual reality will allow a new genre of sensory applications and services to emerge

- Computers are now capable of hearing and speaking
- Virtual reality applications set a new level of quality of service requirements, raising the demand for high-capacity connectivity networks
- Smell is also beginning to find its way into computers, allowing industry to increase quality standards and marketers to capitalize on the many subtle psychological states that smell can induce
- The visual information stream provides the most rapid infusion of information
- The emergence of Wearables will require networks that deal with a massive number of connected devices (e.g. 5G)



- **1. Objectives and rational:** Some taste on the cutting edge of digital technology applications exemplified by the introduction of the human senses into electronic information streams.
- 2. References:
- https://www.informit.com/articles/article.aspx?p=24667#

### 3. Notes:

• The potentials of new digital technology development will allow incorporating human senses in telecommunications.





1. Objectives and rational: To introduce the concept of economic multiplier and the place the telecommunications hold within this framework and provide some references about the impact of broadband in GDP growth. The one displayed in this slide is the forecasted impact of broadband speed in GDP. Broadband is a preferential reference for economic impact given its relative higher impact factor.

### 2. References:

- https://www.weforum.org/agenda/2015/05/the-mobile-industrys-multipliereffect-on-the-global-economy/
- https://www.itu.int/dms\_pub/itu-d/opb/pref/D-PREF-EF.BDR-2020-PDF-E.pdf
- https://documents1.worldbank.org/curated/en/178701467988875888/pdf/10295
  5-WP-Box394845B-PUBLIC-WDR16-BP-Exploring-the-Relationship-between-Broadband-and-Economic-Growth-Minges.pdf
- https://www.gsma.com/publicpolicy/wp-content/uploads/2012/11/gsma-deloitteimpact-mobile-telephony-economic-growth.pdf

- https://data.gsmaintelligence.com/api-web/v2/research-filedownload?id=28999733&file=The%20Mobile%20Economy%20Asia%20Pacific%20 2017%20Infographic.pdf
- 3. Notes:
- In economics, a multiplier refers to an economic factor that, when increased or changed, causes increases or changes in many other related economic variables.
- How the multiplier coefficient works: Final change in a target variable / Initial change in an Input
  - Example: An increase in broadband penetration by X% in a given year, resulted in an increase in GDP by Z%.
- Broadband became a major reference for telecommunications impact studies. It reveals the potentials of this technology as enabler of economic activity.
- Out of a literature review provided by the ITU (2020) the research by Katz ad Callorda (2019) is particularly remarkable.
  - Authors considered an extensive dataset of 159 countries and evaluated the impact of broadband by range of download capacity. Results suggest:
    - Impact of 10 Mbit/s is non-existent;
    - average speed in a range between 10 and 40 Mbit/s, the effect on GDP is positive and statistically significant.
    - The effect on GDP is even greater for download speeds in excess of 40 Mbit/s.



- **1. Objectives and rational:** to highlight opportunities and challenges of digital connectivity (high level opportunities, non exhaustive)
- 2. References:
- https://unctad.org/system/files/official-document/tdb66\_d5\_en.pdf
- https://www.infrastructure.gov.au/sites/default/files/impacts-5g-productivity-economicgrowth.pdf
- https://reports.weforum.org/digital-transformation/understanding-the-impact-ofdigitalization-on-society/
- https://www.oecd.org/economy/growth/digitalisation-productivity-and-inclusiveness/
- 3. Notes:
- Digitalization enables new wave of innovation that will have profound implications for Citizens, Governments and Businesses;
- Reduce transaction costs for businesses and facilitate access to new customers, both in domestic and foreign markets;
- However, uneven access to affordable digital technologies and limited capacities to make effective use of them can lead to an inequitable distribution of benefits.

### **Opportunities**

Productivity growth:

- Digital technologies plays important roles in manufacturing, services, transportation and agriculture.
- Underlying technologies and processes have far-reaching implications for the organization of work, production and trade, extending existing organizational and geographic fragmentation into knowledge-intensive business functions and job categories.
- Companies that engage in digitalization can make their organizations more efficient, reach and serve customers more easily, speed up product development, and invent products and services at lower cost, without the need for extensive system-level expertise or in-house information technologies skills.

## References of broadband capacity

Activity	Broadband speed	Modern applications of broadband use
Searching web	1 Mbps	"5G is intended to provide download speeds of 20
Downloading digital contents	1 Mbps	This represents download speeds 200 faster
Engaging in Social Media	0.03 Mbps	compared to current 4G networks"
Music streaming	2 Mbps	Souce: OECD, 2019
Video Streaming – standard definition	3 Mbps	Autonomous Driving: 1 GB/second
Video Streaming – HD quality	5 Mbps	Smart Hospital: 4000 GB/day
Video Streaming – Ultra HD quality	25 Mbps	Connected Factory: 1 million GB/day
Streaming HD Video lecture	4 Mbps	
Participating in a video conference	4 Mbps	
Engaging in two-way online gaming	4 Mbps	Souce: INTEL, 2018
	Sources: ITU, 2021	European Commission

- **1. Objectives and rational:** to highlight opportunities and challenges of digital connectivity (high level opportunities, non exhaustive)
- 2. References:
- https://gigaconnect.org/wp-content/uploads/2021/11/BCG-Giga-Meaningfulschool-connectivity-1.pdf
- https://connectinglearners.economist.com/data/EIU\_Ericsson\_Connecting.pdf
- https://www.itu.int/en/ITU-D/Technology/Documents/LMC/ITU%20Last-Mile%20Internet%20Connectivity%20Solutions%20Guide%20-%20Slides.pdf
- https://www.intel.com.br/content/www/br/pt/communications/5g-connectedvehicle.html
- https://www.oecd-ilibrary.org/docserver/2f880843en.pdf?expires=1648173280&id=id&accname=guest&checksum=6A40F3D4451DA 914AFE9DFD6A192D17D





 Objectives and rational: The others 50%: ITU estimates the 3.7 billion people does not have access to broadband services.. Fixed broadband subscriptions (2020) (per 100 people)

## 2. References:

- https://data.worldbank.org/indicator/IT.NET.BBND.P2?view=map
- https://www.itu.int/hub/2021/04/strengthening-ties-for-affordable-connectivityworldwide/
- https://broadbandcommission.org/Documents/ITU\_discussionpaper\_Davos2017.pdf

- Fixed broadband subscriptions refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s.
- This includes cable modem, DSL, fiber-to-the-home/building, other fixed (wired)broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband.
- While half the population in the world have internet acces, the other 50% still lacks access to the service.
- Affordability and absence of infrastructure are amongst the leading reasons.
- Other reasons: gender gap, 60% live in rural áreas, individuals with low education, elderly.


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- https://www.itu.int/hub/2021/04/strengthening-ties-for-affordable-connectivityworldwide/
- https://broadbandcommission.org/Documents/ITU\_discussionpaper\_Davos2017.pdf
- https://www.itu.int/itu-d/reports/statistics/2021/11/15/mobile-networkcoverage/#:~:text=Ninety%2Dfive%20per%20cent%20of,cent%20of%20the%20wo

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- 2. References:
- https://unctad.org/system/files/official-document/tdb66\_d5\_en.pdf
- 3. Notes:
- Changing employment and skills:
  - Increased digitalization and the use of frontier technologies is expected to have disruptive effects on jobs and skills.
  - It will lead to the creation of some new jobs and occupations in various sectors, especially in relation to the production of new goods and services or the modification of existing products.
  - At the same time, there is a risk that many tasks will become automated and/or outsourced, making other jobs obsolete and substantially changing the nature of work. Finally, digitalization may change the conditions of work.
    - For example, online labour platforms matching tasks across the whole skills spectrum are expected to transform labour markets by favouring more flexible contracts and increasing competition among

workers, possibly resulting in reduced incomes and social protection.

- Risk of widening inequalities:
  - With regard to bridging inequalities in the developing world, digitalization brings both opportunities and risks.
  - An optimistic vision of the evolving digital economy might emphasize the ubiquity and democratization of information, ushering in a new, equitable and environmentally sustainable growth model based on the maximization of human empowerment and well-being rather than on profits.
  - Companies that engage in digitalization may benefit from new business opportunities and lower market entry costs, increasing the potential for economic development



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- https://www.oecd-ilibrary.org/docserver/aid\_glance-2017-8en.pdf?expires=1648207016&id=id&accname=guest&checksum=379189E2C63DCA86DE9 84964410953B1
- 3. Notes:
- The commenwelath results should be biased by long-distance backbones and low populated areas of Russian Federation.
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Tl in	he C frast	OVID: dem tructure	nand s	hock, impact on digital
Area	Service provider	Area of usage percent increase	Source	
	AT&T (US)	Core network traffic (22%)	AT&T	
Telecommunication raffic	British Telecom (UK)	Fixed network traffic (60% on weekdays)	British Telecom	Internet usage increase triggered by COV 19 The gradual deployment of measures taken to d with COVID-19, such as the closure of workplac and home quarantine, has led to a spike in telecommunication network usage.
	Telecom Italia (Italy)	Internet traffic (70%)	Telecom Italia	
	Vodafone	Mobile data traffic in Italy and Spain (30%)	Vodafone	
		Facebook Messenger (50%)	Facebook	
Over The Top (OTT)	Facebook	WhatsApp (Overall: 50%; Spain: 76%)	WhatsApp	
		Video calling (100%)	Facebook	
	Netflix	Subscriber base (9.6% or 16 million)	Netflix	
	E-commerce (Mexico)	Number of Users (8%)	Competitive Intelligence	
	Zoom	Daily usage (300%)	JP Morgan	
	Cisco Webex	Subscribers (33%)	Cisco	
	Teams (Italy)	Monthly users (775%)	Microsoft	
		S	Source: ITU, 2020	Commis

- 1. Objectives and rational: To explain the demand shock and impact on digital infrastructure after the outbreak of the The COVID-19 and the DECLARED initiatives to mitigate the unexpected demand for connectivity.
- 2. References:
- https://sway.office.com/4AcrIY9R4BMemONI
- Economic impact of COVID-19 on digital infrastructure. ITU Publications.

### 3. Notes:

The gradual deployment of prophylactic measures taken to deal with COVID-19, such as the closure of workplaces and home quarantine, has led to a spike in telecommunication network usage. Overall, Internet traffic has increased by approximately 30 per cent. The transition to telecommuting has brought about a shift from enterprise to residential access. Traffic no longer comes primarily from central business districts, shifting instead to residential areas. Similarly, in response to the lockdown, a portion of data traffic has shifted from mobile to fixed/Wi-Fi networks. Daily traffic patterns have also changed. Contrary to the period prior to COVID-19, Internet traffic has started to surge in the morning at levels close to the evening peak, partly as a result of telecommuting, but also driven by sustained streaming usage.6 Finally, mobile voice traffic has grown strongly, driven by an increase in both the number of calls and their duration.



- 1. Objectives and rational: To explain the demand shock and impact on digital infrastructure after the outbreak of the The COVID-19 and the DECLARED initiatives to mitigate the unexpected demand for connectivity.
- 2. References:
- https://sway.office.com/4AcrlY9R4BMemONI
- Economic impact of COVID-19 on digital infrastructure. ITU Publications.

### 3. Notes:

The gradual deployment of prophylactic measures taken to deal with COVID-19, such as the closure of workplaces and home quarantine, has led to a spike in telecommunication network usage. Overall, Internet traffic has increased by approximately 30 per cent. The transition to telecommuting has brought about a shift from enterprise to residential access. Traffic no longer comes primarily from central business districts, shifting instead to residential areas. Similarly, in response to the lockdown, a portion of data traffic has shifted from mobile to fixed/Wi-Fi networks. Daily traffic patterns have also changed. Contrary to the period prior to COVID-19, Internet traffic has started to surge in the morning at levels close to the evening peak, partly as a result of telecommuting, but also driven by sustained streaming usage.6 Finally, mobile voice traffic has grown strongly, driven by an increase in both the number of calls and their duration.



- **1. Objectives and rational:** Current available picture of relative affordability of fixed broadband basket world wide.
- 2. References:
- https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2020/ITU\_A4AI\_Price\_Briefing\_2020.pdf
- https://a4ai.org/extra/baskets/ITU/2020/fixed\_broadband\_basket
- https://a4ai.org/extra/baskets/ITU/2020/
- 3. Notes:
- The price basket is an index that represents the % of the cost of a typical broadband service given the Gross National Income (GNI) per capita, i.e. the total amount of money earned by a nation's people and businesses. The GNI includes the nation's gross domestic product (GDP) plus the income it receives from overseas sources.

### Price Basket: a reference for affordability (Methodology highlights)

The ITU and the Alliance for Affordable Internet (A4AI) have partnered to collect data and analyze global and regional trends in affordability and pricing for the set of ICT price baskets. Highlights on fixed-broadband Internet prices sampling:

- 1. The prices of the operator with the <u>largest market share</u>.
- 2. Prices should be collected in the currency they are advertised.
- 3. <u>Only residential</u>, single user prices should be collected.
- 4. Other rules: typical plan (cheapest one, technology with the greatest number of subscriptions, Prices should be collected for regular (non-promotional) plans and so on).



### 1. Objectives and rational: The Gaps Model

### 2. References:

- https://openknowledge.worldbank.org/bitstream/handle/10986/5927/518390PUB0REPL101Official0Use0Only1.pdf;sequen ce=1
- 3. Notes:
- The Gap Model is a general analytical framework. This model divides underserved areas into two different segments or "gaps".
- The market gap refers to the difference between the level of penetration that can be reached under current plans and conditions and the level that the market could achieve by means of an ideal regulatory and legal environment.
- The access gap, on the other hand, represents that portion of the market that even under an ideal legal and regulatory environment would not be covered by operators due to its high cost and/or low income level.
  - Within the access gap, there is a level of penetration that is worth noting the sustainability frontier. This frontier divides those projects that are expected to recover their operational costs and remain profitable and those that will not be profitable in any circumstances and will need continuous subsidies.



**1.Objectives and rational:** To exemplify in a non economic view the marginal cost and to indicate the distance as a key driver to marginal Cost increasing.

## 2.References:

- https://www.linkedin.com/pulse/closingconnectivity-gap-brazil-luciano-charlita-defreitas/
- https://www.embrapa.br/busca-de-noticias/-/noticia/28840923/mais-de-80-da-populacao-

brasileira-habita-063-do-territorio-nacional

 https://www.oxfam.org/en/brazil-extremeinequalitynumbers#:~:text=Brazil%20is%20decades%20a way%20from,as%20the%20remaining%2095%2 Opercent.

## 3. Notes:

- Not exhaustive, for illustrative purposes.
- As long as the network reaches the access gap (lower population density, lower relative income, remote and rural areas) the marginal costs of connecting increases.
- The image displays an visual overview of the marginal cost to connect the unconnected in Brazil.
  - By 2018 75% of the Brazilian households had declared broadband connection. Current connectivity policies aims to extend the connectivity to the access gap.
- Regarding costs, there CAPEX and OPEX. The CAPEX is important in the short run. It refers to investments. The Distance to be covered by fiber, for example, is a key driver for CAPEX to connect the unconnected.
- Brazil is the fifth largest country in the world, and third largest in the Americas.
- Brazil's six richest men have the same wealth as poorest 50 percent of the population; around 100 million people. (Oxfam, 2021).
- More than 80% of the Brazilian population inhabits 0.63% of the national territory (IBGE, 2017)
- Total distances between unconnected municipalities and their closest connected counterparts:

- **2016:** 95.218 km
- **2019:** 67.135 km









Source: https://www.connect4climate.org/infographics/paris-agreement-turning-point-climate-solution

## I. The Paris Agreement

- The Agreement was negotiated by 196 parties at the 2015 United Nations Climate Change Conference near Paris, France.
- The Paris Agreement works on a 5- year cycle of increasingly ambitious climate action carried out by countries. By 2020, countries submit their plans for climate action known as nationally determined contributions (NDCs).
- In their NDCs, countries communicate actions they will take to reduce their Greenhouse Gas emissions in order to reach the goals of the Paris Agreement. Countries also communicate in the NDCs actions they will take to build resilience to adapt to the impacts of rising temperatures.



# II. The Sustainable Development Goals (SDGs) (2015)



also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.





Source: Velden, M. Interaction Design and Architecture(s) Journal - IxD&A, N.37, 2018, pp. 160-174. Digitalisation and the UN Sustainable development Goals: What role for design. https://www.smart.uio.no/publications/van-der-velden-digitalisation-and-un-sdg.pdf





Source: https://economie.fgov.be/nl/themas/intellectuele-eigendom/innovatie-en-intellectuele/green-deal-voor-europa





Source: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220225-2

Note: "Following its lowest rate in five years in May 2020 (-11%), energy inflation started to increase but continued to show negative rates up until February 2021, varying between -9% and -1%. From March 2021, energy inflation was positive and increased almost continuously, reaching 26% in November 2021 and 27% in January 2022".



Source: press release March 2, 2022; Towards a green, digital and resilient economy: our European Growth Model:

https://ec.europa.eu/commission/presscorner/detail/en/ip\_22\_1467 https://ec.europa.eu/commission/presscorner/detail/en/IP\_21\_3541



Source: The Dutch digitalisation strategy 2021

# III. Some challenges in implementing The Green Deal, example:

- ...'The opportunities and risks presented by AI and algorithms are a topic of discussion within society, in the media and in political circles. Risk management is a particular focus of debate. Concerns are being raised about the protection of public values and human rights, such as privacy, non-discrimination, autonomy and human dignity'.
- ...'Along with like-minded countries, the Netherlands is actively contributing to the discussion on the legislative framework for AI. On 21 April, the European Commission launched proposals for the further regulation of high-risk AI applications. By te end of this year the Council of Europe will conclude a feasibility study on a legal framework for AI from the perspective of human rights and the democratic rule of law'.



Source: https://www.nederlanddigitaal.nl/documenten/publicaties/2021/06/22/thedutch-digitalisation-strategy-2021-eng



Source: https://www.nederlanddigitaal.nl/documenten/publicaties/2021/06/22/the-dutch-digitalisation-strategy-2021-eng

# III. Some opportunities, other examples from the Netherlands

- There are also opportunities at the national level. For example, **the platform** Anders Reizen (**Transforming Travel**) has reached agreements with all partners to continue to encourage **working from home** after the pandemic.
- The **Climate Agreement** recognises the important role of further digitalisation of the energy system in **replacing existing fossil sources** with often unpredictable renewable sources, such as wind and solar, for a carbon-free electricity system.



# III. Some opportunities, other examples from the Netherlands

- the public-private **LEAP coalition** is working to bring about a significant **reduction in the energy consumption of data centres**. The first step is to achieve average energy savings of 10% by adjusting the server settings.
- The **Raw Materials Agreement** features incentives to work in a data-driven way in the pursuit of a circular economy, in which **raw materials are used and reused in the most efficient possible way**. A truly circular market requires cooperation and information sharing within and between chains. A report commissioned by the Ministry of Infrastructure and Water Management suggests that this can act as a catalyst for scaling up successful initiatives for the 'circularisation' of consumer goods





Source: Towards a green, digital and resilient economy: our European Growth Model (March 2022)





Source: European Commission, Directorate-General for Communication, *EU as a global leader : the European Green Deal*, Publications Office, 2019, <u>https://data.europa.eu/doi/10.2775/689693</u>


Source: https://ec.europa.eu/info/strategy/priorities-2019-2024/stronger-europe-world/global-gateway\_en

## V. Digital Global Gateway Initiative (2021)

The Global Gateway stands for "sustainable and trusted **connections** that work for people and the planet. It will help to tackle the most pressing global challenges".

Key areas of financing (300 billion Euros) in the Global Gateway Initiative

for partnerships include:

- 1. Digital
- 2. Climate / Energy
- 3. Transport
- 4. Health
- 5. Education / Research.





https://ec.europa.eu/commission/presscorner/detail/en/ip\_21\_6433



#### Democratic values and high standards

Global Gateway is a value-based model. This means, investments in line with the rule of law, human rights and international norms.

#### Good governance and transparency

Global Gateway delivers transparency and sustainability of projects. We deliver what we promise.

#### **Equal Partnerships**

Global Gateway projects will be developed with partners. They will meet their needs and opportunities, as well as EU's strategic interests.

#### Green and clean

Global Gateway is our strategy to support our partners speed up their green transition and move to a circular economy.

#### Security focused

Global Gateway projects will be safe and resilient to natural or man-made disasters, cyber and hybrid threats.

#### **Catalyse private sector**

Global Gateway will attract investment involving Europe's leading industry, private sector knowledge and investment capacity



#### Digital.

The EU will support open and secure internet

#### Climate and energy.

The EU will support investments and rules paving the way to the clean energy transition

#### Transport.

The EU will support all modes of green, smart and safe transport

#### Health.

The EU will help strengthen supply chains and local vaccines production

#### Education and Research.

The EU will invest in high quality education, with a special focus on girls and women and vulnerable groups



Digitalisation

- "The EU will work with partner countries to **deploy digital networks** and infrastructures ..."
- ".. We will **prioritise underserved regions**, countries and populations, with the aim of tackling the global digital divide and strengthening secure digital connections within them and between Europe and the world".
- "..The EU will minimize the environmental footprint of digital infrastructure, by promoting green data centres and deploying underwater cables equipped with ocean monitoring sensors".

#### Digital.

The EU will support open and secure internet

#### Climate and energy.

The EU will support investments and rules paving the way to the clean energy transition

#### Transport.

The EU will support all modes of green, smart and safe transport

#### Health.

The EU will help strengthen supply chains and local vaccines production

#### Education and Research.

The EU will invest in high quality education, with a special focus on girls and women and vulnerable groups



- "EU will **invest in infrastructure and supporting regulation** to pave the way for the clean energy transition in partner countries.."
- "We will cooperate with partner countries to enable their **just energy transition** and to **diversify our clean energy supply** at the same time.".
- "The EU will support **regional energy integration**, promote energy efficiency, renewable energy (including smart grids) and just transition.."

Climate & energy

• "We will work with partner countries that have the potential to develop their renewable hydrogen production.."

#### "...The EU will also work with partner countries to invest in infrastructure for developing sustainable and resilient raw materials value chains".

#### Digital.

The EU will support open and secure internet

#### Climate and energy.

The EU will support investments and rules paving the way to the clean energy transition

#### Transport.

The EU will support all modes of green, smart and safe transport

#### Health.

The EU will help strengthen supply chains and local vaccines production

#### Education and Research.

The EU will invest in high quality education, with a special focus on girls and women and vulnerable groups



- "Global Gateway will promote worldwide infrastructure investments that create sustainable .. safe transport networks in all modes of transport...
- "We will implement **transport** infrastructure projects that foster the sustainable development of partner countries and reduce greenhouse gas emissions, as well as enable the **diversification of their supply chains**".

Transport

"We will also seek to build on our position as the **world's transportation hub**".



#### Digital.

The EU will support open and secure internet

#### Climate and energy.

The EU will support investments and rules paving the way to the clean energy transition

#### Transport.

The EU will support all modes of green, smart and safe transport

#### Health.

The EU will help strengthen supply chains and local vaccines production

#### Education and Research.

The EU will invest in high quality education, with a special focus on girls and women and vulnerable groups



Health

- "Global Gateway will prioritise the **security of supply chains** and the development of **local manufacturing**".
- "As regards the security of supply chains, the EU will be working with partner countries to **diversify** their pharmaceutical **supply chains**".
- "The Health and Emergency Preparedness and Response Authority (HERA) will also contribute to addressing international supply chain bottlenecks and establish close collaboration with global partners.".

#### Digital.

The EU will support open and secure internet

#### Climate and energy.

The EU will support investments and rules paving the way to the clean energy transition

#### Transport.

The EU will support all modes of green, smart and safe transport

#### Health.

The EU will help strengthen supply chains and local vaccines production

#### Education and Research.

The EU will invest in high quality education, with a special focus on girls and women and vulnerable groups



• "The EU will **invest in quality education**, including digital education and work with partner countries to strengthen cooperation on research and innovation".

Education & research



#### Digital.

The EU will support open and secure internet

#### Climate and energy.

The EU will support investments and rules paving the way to the clean energy transition

#### Transport.

The EU will support all modes of green, smart and safe transport

#### Health.

The EU will help strengthen supply chains and local vaccines production

#### Education and Research.

The EU will invest in high quality education, with a special focus on girls and women and vulnerable groups



- ...an EU plan for major investment in infrastructure development around the world post-COVID & post-COP26.
- ...will be under the overall steer of President von der Leyen.
- ...projects will be developed through Team Europe.
- ...will be a priority for discussion in upcoming international Summits and multilateral fora.

Note: Team Europe consists of the European Union, the EU Member States — including their implementing agencies and public development banks —, as well as the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD).

Since its launch as part of the EU's global response to the Covid-19 pandemic in April 2020, the concept of Team Europe has been incorporated into the working better together approach, in order to further improve the coherence and coordination of efforts, notably at partner country level.

Source: https://europa.eu/capacity4dev/wbt-team-europe

### V. Digital Global Gateway - objectives

- Creating a highly visible initiative on Connectivity that can match the competing packages of China and the USA
- Tackling the global digital divide: digital divide between and within regions, impact on economy and stalling the development of core sectors such as education, health and agriculture. For instance, Europe has 40 times higher bandwidth per capita than Sub-Saharan Africa.
- Promoting EU services and assets (i.e. Copernicus and Galileo) across the globe.
- Promoting a human-centric connectivity and the open internet: This includes the promotion of a free, open and secure internet, reducing the risk of alternative internet deployments and internet fragmentation.
- Fostering Global Cooperation on Research and Innovation: Fibre-optic submarine cables provide users with high-speed connectivity, enabling large volumes of data to be exchanged and, with the development of the needed data and computing infrastructures, to be processed and modelled. i.e. GEANT, BELLA cable.
- Safeguarding Europe's digital sovereignty: The digital competitiveness and sovereignty of the EU is highly
  dependent on its internal and external connections, particularly the security of digital and data infrastructures and
  services.



### V. Digital Global Gateway – What?

- International Connectivity Connecting Europe to other continents; This includes submarine cables (99% of
  international connectivity links) and satellite connectivity; replacing old with new submarine cables to serve demand
  with capacity; diversifying international links to decrease dependencies on specific infrastructures; increasing overall
  resilience of connections;
- Regional Connectivity Tackling the digital divide and fostering traffic volumes among EU partner countries and regions; This includes supporting the development of regional terrestrial backbones and the connection of missing links between countries;
- Data Infrastructures and Open Internet Ensure secure and free internet connectivity. This includes data storage and processing in line with EU values and standards by investing in data infrastructures (IXP, Content Delivery Networks, data centres) and upgrading and deploying internet standards (IPv6 and QUIC).
- National Connectivity serving the underserved. de-risking high-risk investments or providing incentives for last mile solutions (e.g., blending). This level entails both terrestrial backbone infrastructures and Internet connectivity (e.g. IXPs) and last mile connectivity (Wi-Fi, Satellite, DSL, etc.) for individuals, public institutions, businesses, etc.
- Secure and trusted connectivity: hardware and software, policies and regulations in line with EU and international
  values and standards (cybersecurity, 5G toolbox, GDRP, etc.)





# V. Connectivity Partnerships with Japan and India

- On the occasion of the EU-India Leaders' Meeting in Porto and via video conference, the EU and India have concluded a comprehensive Connectivity Partnership, confirming their commitment to collaborate on supporting resilient and sustainable connectivity both in India and in third countries and regions, including Africa, Central Asia and the Indo-Pacific.
- "..This Connectivity Partnership will guide our actions over the coming years, providing for joint efforts in creating a greener, more inclusive and prosperous future for the EU, India, and in regions around the world."

May 2021. Principles, Partnership, Prosperity: EU and India launch collaboration on sustainable connectivity.

https://ec.europa.eu/commission/presscorner/detail/en/ip\_21\_2327

## V. US Build Back Better World (B3W)

- Build Back Better World: An Affirmative Initiative for Meeting the Tremendous Infrastructure Needs of Low- and Middle-Income Countries. President Biden and G7 partners agreed to launch the bold new global infrastructure initiative Build Back Better World (B3W), a values-driven, high-standard, and transparent infrastructure partnership led by major democracies to help narrow the \$40+ trillion infrastructure need in the developing world, which has been exacerbated by the COVID-19 pandemic.
- Through B3W, the G7 and other like-minded partners will coordinate in mobilizing privatesector capital in four areas of focus—climate, health and health security, digital technology, and gender equity and equality—with catalytic investments from our respective development finance institutions.
- B3W will be global in scope, from Latin America and the Caribbean to Africa to the Indo-Pacific. Different G7 partners will have different geographic orientations, but the sum of the initiative will cover low- and middle-income countries across the world.

Source: The White House, June 2021. Briefing https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/12/fact-sheet-president-biden-and-g7-leaders-launch-build-back-better-world-b3w-

partnership/#:~:text=President%20Biden%20and%20G7%20partners,developing%20 world%2C%20which%20has%20been



Source: https://www.gov.uk/government/news/pm-launches-new-initiative-to-take-green-industrial-revolution-global





Source: https://farmofthefuture.nl/en/farm-of-the-future-in-lelystad/

#### VI. Examples: Farm of the future in the Netherlands

The Farm of the Future also functions as a discussion platform and knowledge centre for parties who want to move forward with circular agriculture in outdoor cultivation.

The Farm serves as a link in the knowledge and innovation chain for on-farm practice. In 2021, the first steps will be taken towards the creation of a monitoring network and data infrastructure for the development and recording of important crop, soil and biodiversity parameters in new types of cultivation systems, such as strip cropping. This data will be collected in a dashboard that provides insight into the development of the Model Company.

Source: https://farmofthefuture.nl/en/farm-of-the-future-in-lelystad/



Source: Rami D. Orejon-Sanchez, David Crespo-Garcia, Jose R. Andres-Diaz, Alfonso Gago-Calderon, Smart cities' development in Spain, Sustainable Cities and Society, Volume 81, 2022,, https://doi.org/10.1016/j.scs.2022.103828.



#### VI. Examples Spain: Connected industry

This Spanish government has allocated significant resources in ensuring that a Spanish model responding to the industry specific challenges is developed.

Compared to related policies in Europe, the **uniqueness** of Cl4.0 concerns its particular **focus on supporting the implementation of digital transformation projects by providing support to SMEs and micro enterprises** as well as providing a personalised service to guide SMEs in this process.

Meanwhile, developing a **holistic model** with the help of a wide range of stakeholders from different backgrounds has proven to be a **key challenge** in this policy initiative.







# VII Quiz answer: What are new elements in the Global Gateway Initiative?

- Global Gateway will be implemented in a **Team Europe approach**, that brings together funding by the EU, its Member States and European financial institutions, ensuring that investments can be targeted and more effective, strengthening existing initiatives and fostering new ones.
- It will focus on physical infrastructure such as fibre optic cables, transport corridors, clean power transmission lines - to strengthen digital, transport and energy networks.
- Secure and trusted connectivity: hardware and software, policies and regulations in line with EU and international values and standards (cybersecurity, 5G toolbox, GDRP, etc.)

https://ec.europa.eu/commission/presscorner/detail/en/qanda\_21\_6434





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