Digital Financial Services and Infrastructure under COVID-19

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Abstract

The COVID-19 crisis has left a devastating impact, not just on human lives and well-being, but also on vital areas such as the economy, employment, trade and travel. Indeed, the effect of this crisis is unprecedented. To mitigate and to have sustainable growth, the society may need to transform via digitalization in reaching out to the underserved.

This background paper discusses the apparent pain-points and feasible policy responses elaborated in a separate policy brief, which include 5G, Edge Computing, Mesh Network, and Digital Identity. Beyond the technologies, grants, education, and investments policies are essential. Finally, the paper ends off with a case study on Singapore to illustrate some of the technologies or policies implemented.

Impacts of COVID-19

COVID-19 has left a trail of devastation on our economy since its emergence. Figure 1 highlights the impact on the economy, trade, and travel. The crisis points to the dire need for change, and there is an urgent need to transform our current business model.

Figure 1: Impact of COVID-19 on the economy, employment, travel, and trade
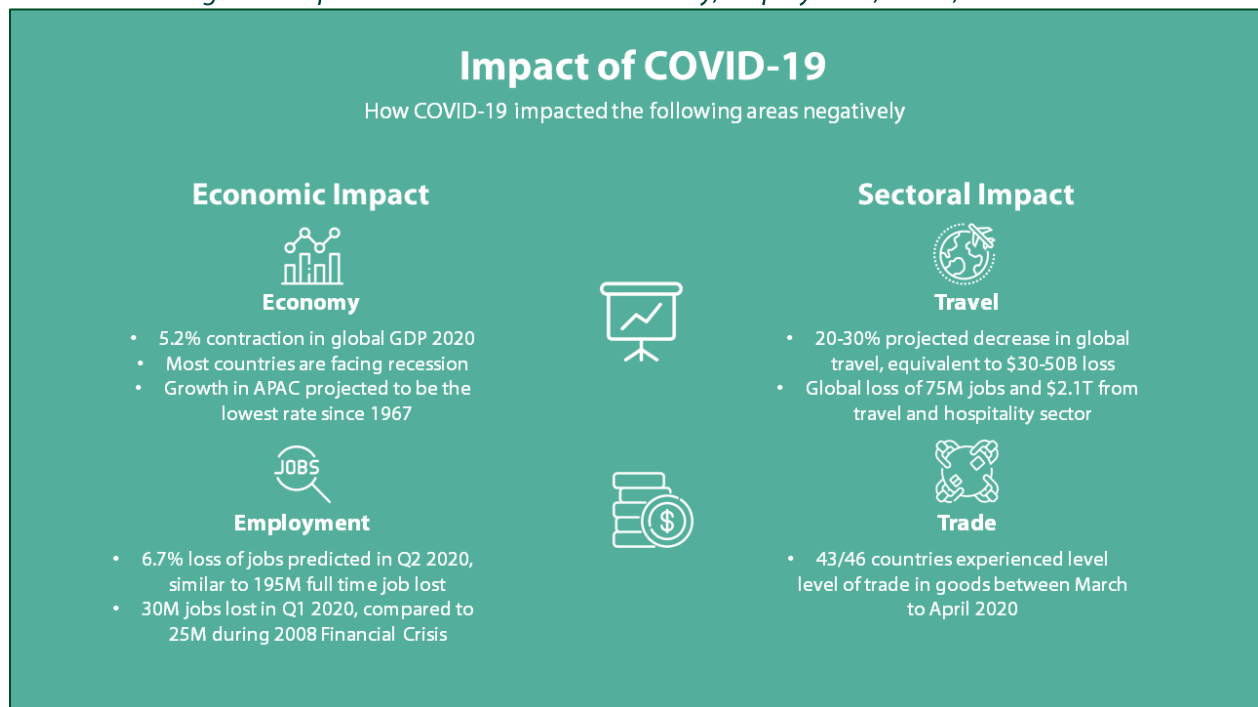
Source: World Bank, IMF, OECD, Financial Times, BBC, UNWTO, National Geographic, Statista

The Silver Lining: Telecommunication and Infrastructure

Despite the adverse impact of COVID-19, there is a silver lining which we can capitalise on, and that is connectivity. As business entities shift to remote working and telecommunication, we are experiencing
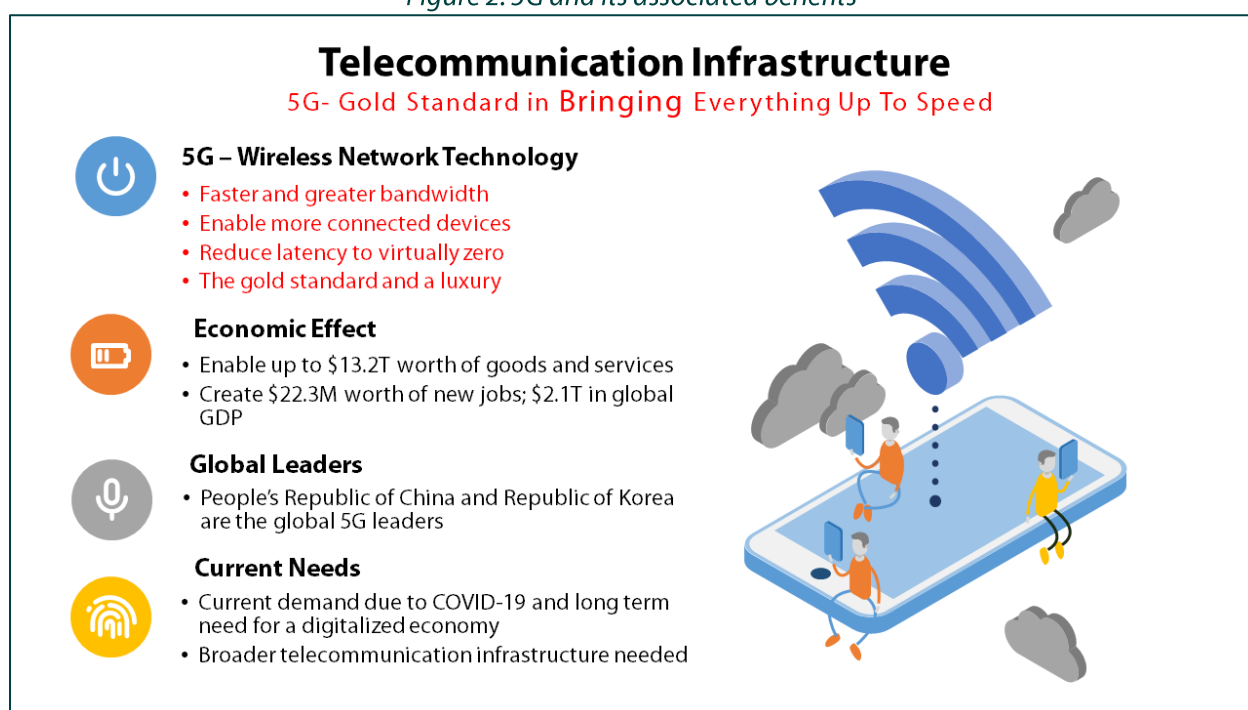

Note: $ refer to US$

as much as 60% more Internet traffic than before the outbreak.[1] Given the uncertainty, network operators need to prepare for further demand surge, manage the communication facilities, keep track of the critical network infrastructure service performance, and prevent congestion. To enhance bandwidth, two forms of technology are available as the 'Gold Standards'.

5G (and 6G)

5G and 6G refer to the next generations (5th and 6th, respectively) wireless network technology. 5G is faster, has greater bandwidth so it can enable more connected devices, and will reduce latency to virtually zero.[2] 6G then provides even higher performance in all aspects.[3] Figure 2 summarizes the benefits of 5G in enabling other technology.

Figure 2: 5G and its associated benefits

Telecommunication Infrastructure
5G- Gold Standard in **Bringing** Everything Up To Speed

5G – Wireless Network Technology
- Faster and greater bandwidth
- Enable more connected devices
- Reduce latency to virtually zero
- The gold standard and a luxury

Economic Effect
- Enable up to $13.2T worth of goods and services
- Create $22.3M worth of new jobs; $2.1T in global GDP

Global Leaders
- People's Republic of China and Republic of Korea are the global 5G leaders

Current Needs
- Current demand due to COVID-19 and long term need for a digitalized economy
- Broader telecommunication infrastructure needed

Source: Samsung; Qualcomm; Digitaltrends; Ericsson; TheFastMode

A landmark 5G Economy study reveals that 5G's full economic effect will likely be realised across the globe by 2035 - supporting a wide range of industries and potentially enabling up to $13.2 trillion worth

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[1] https://www.oecd.org/coronavirus/policy-responses/keeping-the-internet-up-and-running-in-times-of-crisis-4017c4c9/
[2] https://www.cnn.com/interactive/2020/03/business/what-is-5g/index.html
[3] https://news.samsung.com/global/samsungs-6g-white-paper-lays-out-the-companys-vision-for-the-next-generation-of-communications-technology

of goods and services.[4] Also, it can bring about $22.3 Million worth of new jobs, which helps to tackle the economic downturn caused by COVID-19.
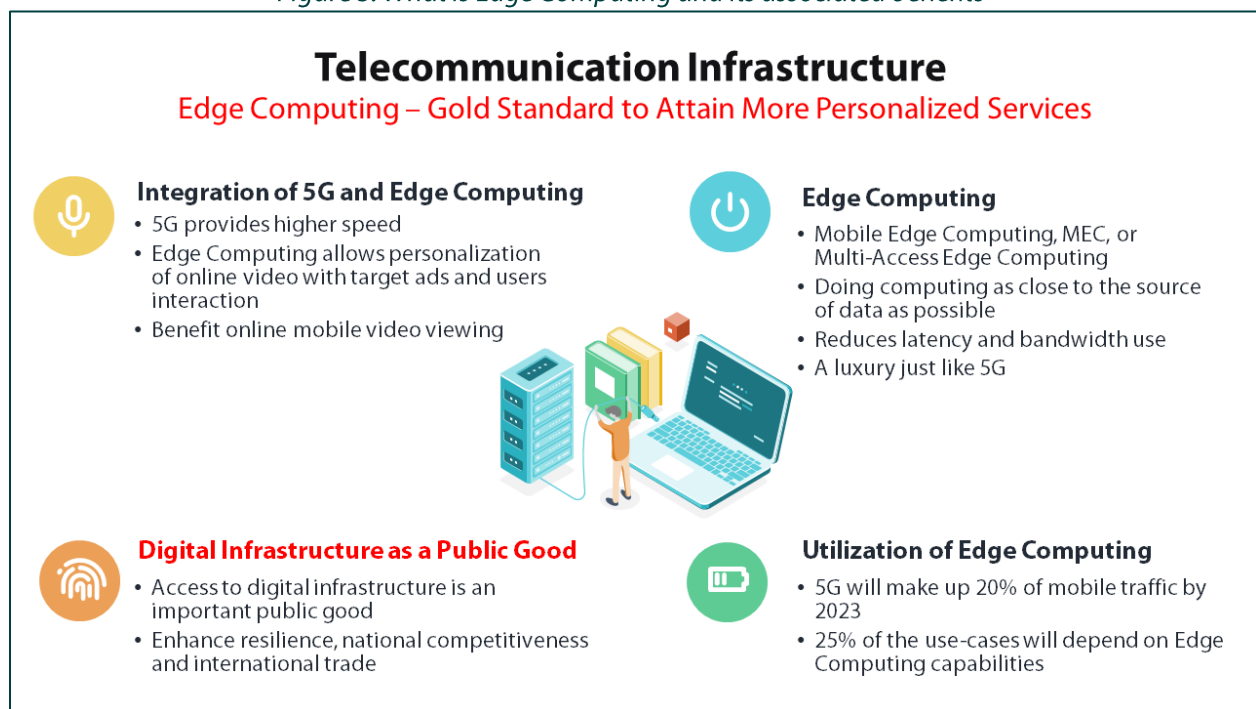
One of the nations that invest heavily in 5G during this pandemic is the People's Republic of China (PRC). The coronavirus epidemic has accelerated PRC's policy support for 5G, along with consumers' increasing demand for a faster internet during telecommuting, online education and live-streaming.[5]

Edge Computing

Edge computing is a part of a distributed computing topology in which information processing is located close to the edge – where things and people produce or consume that information.[6] Edge computing, sometimes referred to as Mobile Edge Computing, MEC, or Multi-Access Edge Computing, is a process focused on doing computing at or as close to the source of data as possible for reducing latency and bandwidth use. It moves the networking, computing, and storage functionality from a centralised cloud to the edge of the network.

IoT, 4G networks, and next-generation 5G networks are the critical drivers for edge computing.[7] Figure 3 illustrates several benefits associated with Edge Computing.

Figure 3: What is Edge Computing and its associated benefits

Source: Author

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4   https://www.qualcomm.com/invention/5g/what-is-5g
5   https://www.globaltimes.cn/content/1188617.shtml
6   https://www.gartner.com/en/information-technology/glossary/edge-computing
7   https://www.altencalsoftlabs.com/blog/2020/03/how-edge-computing-is-revolutionizing-the-telecom-industry/

By 2023, 5G will make up around 1/5 of all mobile data traffic, where 25% of the use-cases will depend on edge computing capabilities.[8] The integration of 5G and edge computing will bring several benefits to online mobile video viewing.[9]

Communication and Beyond: Inclusion

Need for Inclusion: Unconnected People

What our world faces today is a severe technology gap. Access to the Internet or broadband across regions vary greatly and are unequal. According to Statista, by July 2020, about 59 percent of the global population, almost 4.57 billion people, are internet users, which means over 3 billion people in the world still do not have internet access.[10]

The number of fixed broadband subscriptions per 100 people in the world is about 13, and the average number in individual countries range from over 40 in countries like the Republic of Korea and Germany to only one in Pakistan.[11] Despite the advantages of deploying 5G/6G and Edge Computing, these technologies are the gold standard and beyond reach for most countries. The primary concerns surrounding the inadequate infrastructure are *cost and scalability*.

However, there are opportunities within the emerging markets. In Sub-Saharan Africa, the average income of people is just $1 per day. Still, according to a study done by the Global System Mobile Association in July of 2018, more than half of Sub-Saharan Africa will be subscribed to a mobile service by 2025.[12] This number signals that leapfrogging by the emerging markets is possible, given the nascent playing field. Democratizing communication is a policy pursued by the emerging market to gain competitiveness.

There is a need for acceptable and yet cheaper forms of infrastructure. Two alternatives are proposed, namely, Mesh Network and Satellite. Besides, to further connect those unconnected and to improve the travel and trade sectors, other forms of action plans, including digital identity and education grants, will be discussed in subsequent sections.

Mesh Network

Mesh means strong interconnection among devices or nodes, and a mesh network refers to a group of devices or nodes that act as a single WiFi network. Instead of relying only on one single router in the traditional network, mesh network provides multiple WiFi sources, thus providing data communication that is faster, smoother, and more reliable.

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[8] https://www.ericsson.com/en/digital-services/edge-computing
[9] https://www.thefastmode.com/technology-solutions/16504-how-5g-and-edge-computing-will-change-the-telecom-industry-in-2020
[10] https://www.statista.com/statistics/617136/digital-population-worldwide/
[11] https://ourworldindata.org/internet
[12] https://hackernoon.com/bitcoin-for-the-unbanked-how-mesh-and-microfinance-could-end-poverty-as-we-know-it-547bf22c2e1e

In traditional WiFi network, the internet speed will be slower as the distance from router goes up, while the multiple points in mesh network can all serve as routers and thus provide full WiFi coverage, as long as the router or primary point that connects to the modem stays online. Should one point go down, communication is simply rerouted through another point in the network.[13]

In addition, Mesh Network also has the advantage of easy to expand as additional points can be added to the network and act like router and provide internet access, which is extremely valuable for places with poor connection or limited internet infrastructure. In practice, Mesh Network had been implemented by Google, which includes products such as Google Home, Google Wi-Fi, and Google OnHub.[14] Mesh Network is useful for remote villages or isolated islands to be linked with mesh boxes providing storage. Signals bounce off both the mesh boxes and mobile digital devices to link up the community. Figure 4 summarizes the benefits of the Mesh Network.

Figure 4: Mesh Network and associated benefits
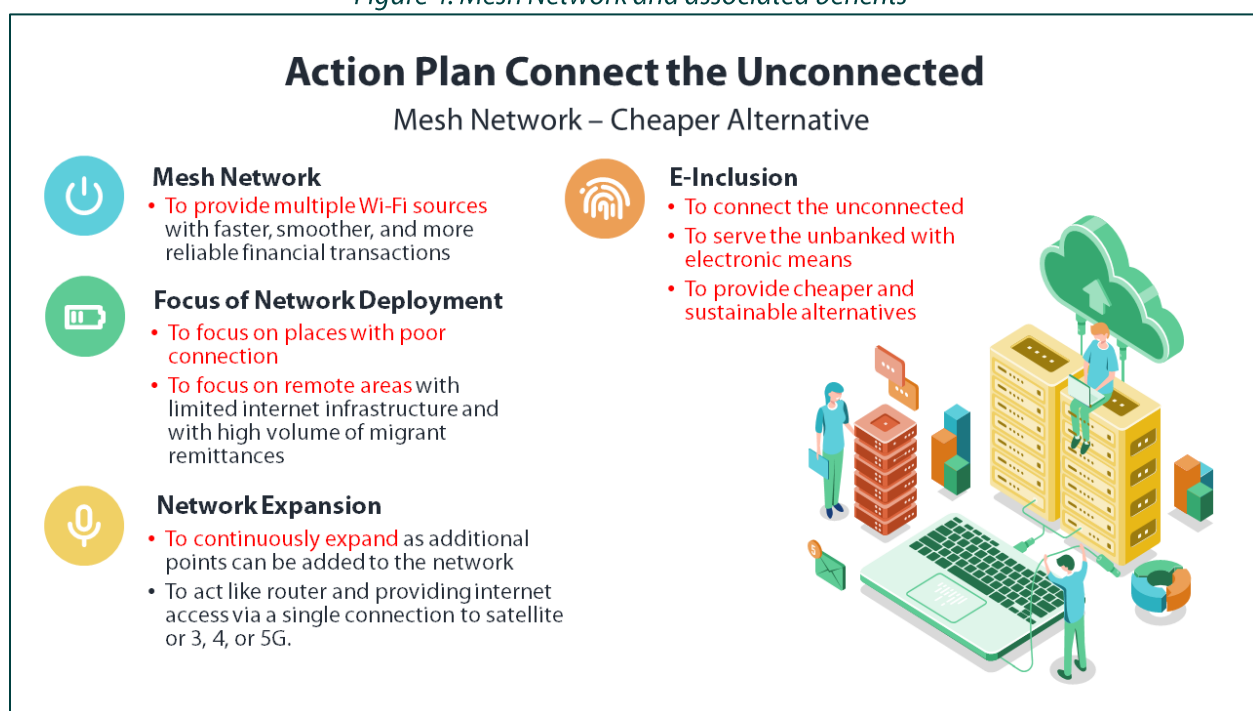
Source: Author

Satellite

Hundreds of satellites are monitoring the earth right now, registering changes related to crop growth, land use, soil moisture, floods, and plantation age. Satellites have a wide coverage of the global activities and generate a huge amount of data, which may help financial inclusion and other decisions. For example, satellite data can help financial institutions to locate farmers and measure their crop performance remotely. Data on the farmers is needed by the banks to provide input for risk models in

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[13] https://support.google.com/wifi/answer/7182746?hl=en
[14] https://www.androidcentral.com/how-wifi-mesh-networks-work?_ga=2.118951497.1982325821.1494489061-1333092243.1494489050

order to give out loans.[15] Rabobank and Wageningen University, for example, finished a successful pilot in Ethiopia for a tool to monitor smallholders' crops. The tool, Climate Smart Digital Farm Finance (CSDFF) Solution, provides banks with data on crop production while reducing the need to visit farms in remote areas.[16]

Other example includes MUIIS Service Uganda which offers satellite data-based advice, insurance, and credit services to farmers in Uganda. Similarly, the SUM-Africa project provides satellite data-based drought insurance services to smallholder farmers in Mali and Uganda. In these areas, droughts and unreliable climate conditions are leading to poverty. These projects are pioneering in offering lower-cost financial products to previously unreachable farmers.[17] These examples reflect the ability of satellites as a valuable public good which can serve to provide affordable and secured solutions for money transfer in the once excluded remote areas.

By linking a satellite with the Mesh Network, the entire village or island will have access to the Internet and outside world even though there is no 3/4/5G network. The hybrid network is a cheaper and more environmentally friendly form of connectivity if there is access to solar or other forms of green energy.

Digital Identity

Self-Sovereign Identity

Self-Sovereign Identity refers to users in control of their individual identity data. This control requires not just the interoperability of a user's identity across multiple locations, with the user's consent, but also through user control of that digital identity, creating user autonomy. A self-sovereign identity must also allow ordinary users to make claims, which could include personally identifying information or facts about personal capability or group membership. It can even contain information about the user that was asserted by other persons or groups.[18] To accomplish this, a self-sovereign identity must be portable, i.e., it cannot be locked down to one site or locale. The benefits of digital identity are described in Figure 5.

With digital identity in place, technologies such as cross-border remittance transaction and cross-zone travel can be made possible.
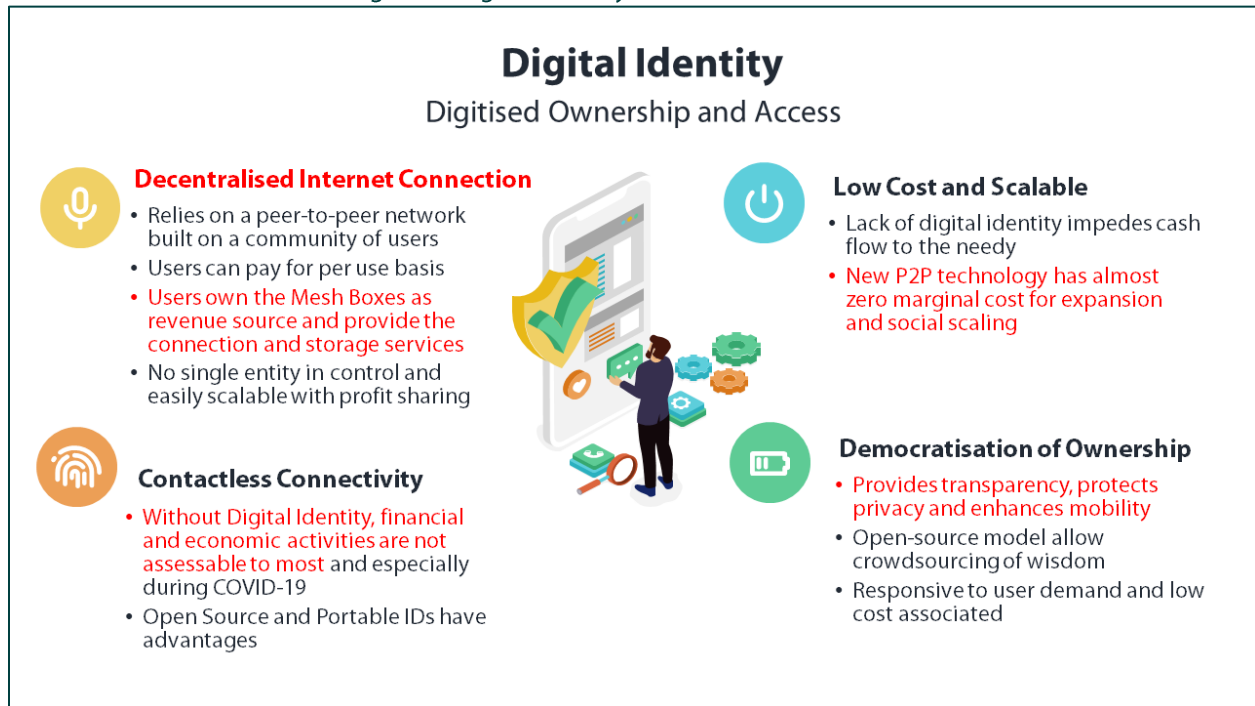
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[15] https://geoawesomeness.com/3-ways-satellite-finance/
[16] Same as Footnote 15
[17] Same as Footnote 16
[18] https://www.coindesk.com/path-self-sovereign-identity

Figure 5: Digital Identity and benefits associated

Source: Author

Cross-Border Remittance Capabilities

Introduction to Cross-Border Remittances Capabilities

Cross-border remittances capabilities can be realized via globalized and accepted currencies which include three categories: virtual assets, stable coins, and Central Bank Digital Currencies (CBDCs). All these instruments arise due to the empowerment of inclusive deep chain technology; they featured inclusiveness and improving the efficiency of cross-border transactions. Figure 6 gives a summary of these instruments and their horizons.

Mobility and Travel

Travel Bubble

The first travel bubble in Asia and the Pacific was established between the People's Republic of China and the Republic of Korea on May 1, 2020. The agreement is limited to business travelers who need to be invited by a company in the receiving country. Visitors need to monitor their health for two weeks and get tested for the virus 72 hours before departure from their home country. Upon arrival, they are tested again and quarantined until the results are obtained.[19] Other travel bubbles under negotiation

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[19] https://www.reuters.com/article/us-health-coronavirus-thailand-tourism/tourism-reliant-thailand-shelves-travel-bubble-plan-as-asia-virus-cases-rise-idUSKCN2520QM

aim to allow movement of cross-border commuters (Malaysia and Singapore) and tourists (the "Bula bubble" involving Australia, Fiji, and New Zealand).[20]

Figure 6: Cross-Border Remittance Capabilities: Instruments and their capabilities
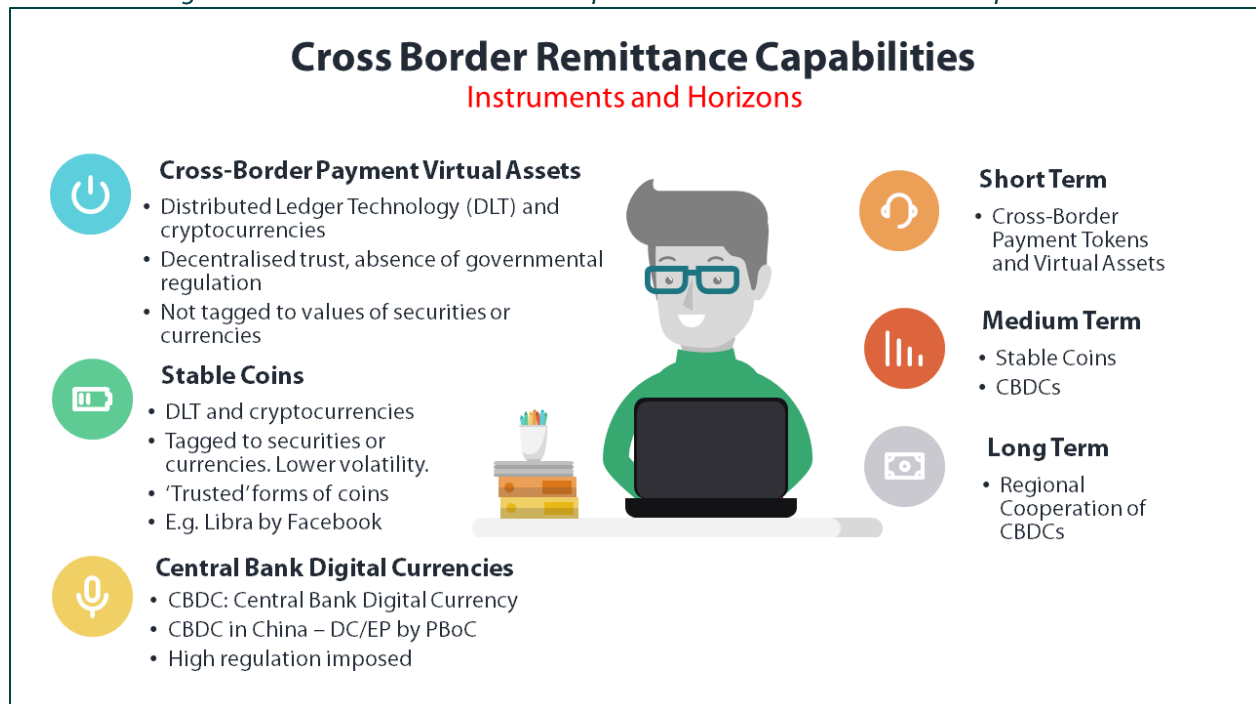
Source: Monetary Authority of Singapore and Author

Travel Zones

Travel zones are demarcated areas which restrict the movement of internal travel. For example, within the National University of Singapore, zoning across campuses will be introduced to reduce overcrowding, cross-interaction and prevent cross-infection (five self-sufficient zones with its own dining and studying areas). Staff and students are required to stay within their designated zones for all activities, including teaching, research, and residence on campus. To ensure effectiveness, the leading medical point University Health Center is set as a neutral zone so that all staff and students can seek medical attention when necessary in the zoning period.[21]

Flight Pass

Flight passes are tickets which can be used for internal travel. Usually, they offer unlimited travel within a fixed frame of time. For example, AirAsia unlimited 1-year pass at RM499 ($120) to members in Malaysia; 3-month unlimited domestic flight pass at $699 by Flair Airlines in Canada; 1-year (6-month) unlimited domestic flight pass at $385 by VietJet Air in Viet Nam.[22]

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[20] Same as Footnote 19.
[21] https://emergency.nus.edu.sg/downloads/2020_0603_FAQs_COVID-19.pdf
[22] https://m.sohu.com/a/388166446_293963

Tests and Screening

Safe means guests are selected from a city with a record of no infections for at least 30 days, and they can travel under the sealed conditions provided by tour operators in designated hotels and provinces that agree to welcome those tourists. Other necessary screening processes are also required, such as an infection-free certificate 72 hours before a flight, as well as insurance and swab tests.[23]

Tests and screening could be combined with digital ID and QR code to attain maximum effectiveness. For example, the Chinese government has used a color-based "health code" system to control people's movements and curb the spread of the coronavirus, relying on mobile technology and big data. The automatically generated quick response codes, commonly abbreviated to QR codes, are assigned to citizens as an indicator of their health status. Although authorities have yet to make the health codes compulsory, people who need to travel across cities or provinces in PRC must present their codes first. In many cities, citizens without the app would not be able to leave their residential compounds or enter most public places.[24]

Case Study: Singapore Initiatives

Overview of Singapore Initiatives

The cases stated above are implemented before or are in the process of implementation. One example is Singapore which leveraged on cross-border remittance technology, grants and education, expansion of the Infocomm Sector and job support grants to overcome the challenges brought about by COVID-19. Figure 7 offers an overview of some key Singapore Initiatives.

Initiatives by Monetary Authority of Singapore (MAS)

MAS had proposed a few key commitments, initiatives, and regulations to overcome the current crisis. MAS commitment comes in two areas: keeping supply chain opened and strengthening digital connectivity in trade and food safety. Figure 8 offers an overview of MAS' commitment.

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[23] https://www.bangkokpost.com/business/1963463/safe-and-sealed-brings-hope-for-tourism-rally
[24] https://edition.cnn.com/2020/04/15/asia/china-coronavirus-qr-code-intl-hnk/index.html

Figure 7: Overview of Singapore Initiatives

Singapore Initiatives Overview

Project Ubin
1. CBDC and regional cooperation

Business Sustenance Grant
2. Grant in assisting staff retention

Business Growth Grant
3. Grant in assisting Fintech

Digital Acceleration Grant
4. Grants in assisting company digitalise

Training Allowance Grant
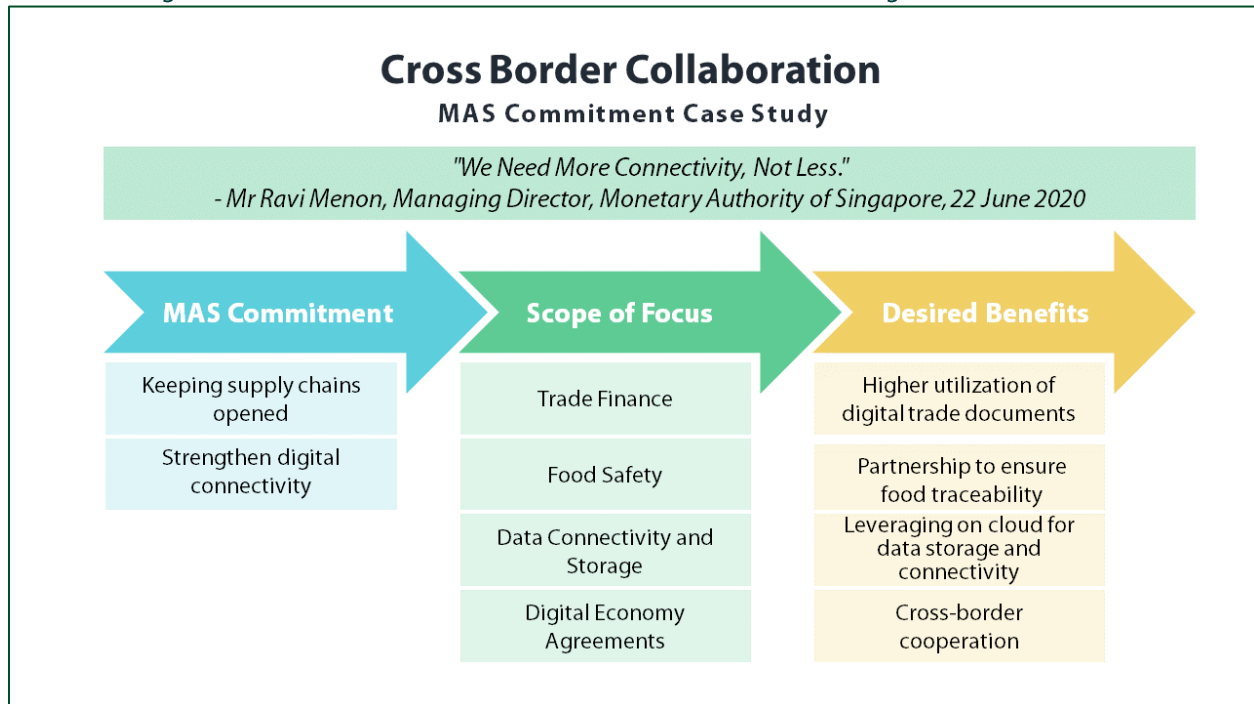5. Training and education grants

Digital Banking Licensing
6. License for new digital banks

Payment Service Act
7. Governs payment

Digital Resilience Bonus
8. Helping F&B and Retail digitalise

ICT Sector Accelerator
9. Expand the ICT sector and provide training

Job Support Scheme
10. Staff Retention for all companies

Company-Led Training
11. Training and educating the workforce

TeSA Mid-Career Advancement
12. Train senior professionals with relevant ICT skills

Source: Monetary Authority of Singapore

Figure 8: MAS Commitment to cross-border collaboration and digitalization of trade

Cross Border Collaboration
MAS Commitment Case Study

"We Need More Connectivity, Not Less."
- Mr Ravi Menon, Managing Director, Monetary Authority of Singapore, 22 June 2020

MAS Commitment	Scope of Focus	Desired Benefits
Keeping supply chains opened	Trade Finance	Higher utilization of digital trade documents
Strengthen digital connectivity	Food Safety	Partnership to ensure food traceability
	Data Connectivity and Storage	Leveraging on cloud for data storage and connectivity
	Digital Economy Agreements	Cross-border cooperation

Source: Monetary Authority of Singapore

In addition, MAS had launched project Ubin, which is an initiative to tokenize the Singapore Dollar, in order to improve the efficiency of clearance and settlement using the Singapore currency. Figure 9 outlines the phases and milestones of this project.

*Figure 9: Project Ubin and its implementation*
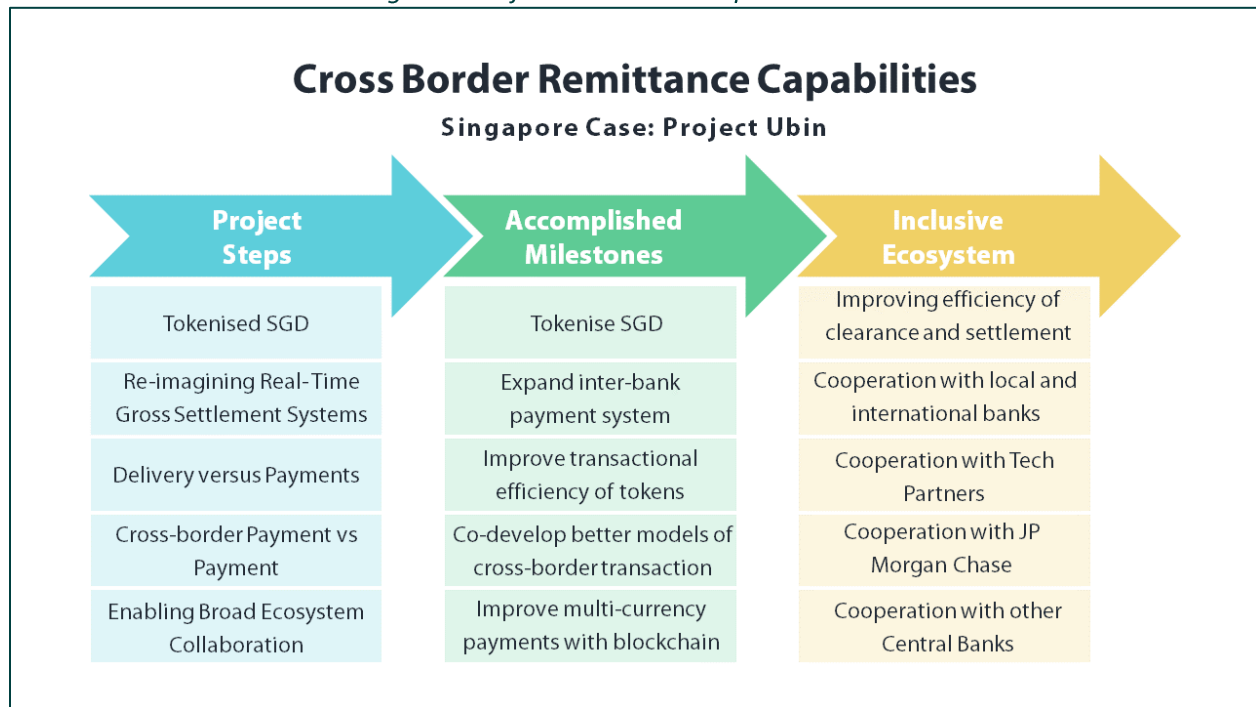
Source: Monetary Authority of Singapore

Finally, MAS recognized Fintech as the area of future growth. As such, they had offered grants such as the Business Sustenance Grant, Training Allowance Grant, Acceleration Grant and the Business Growth Grant. These grants help Fintech companies retain their staff and help Fintech companies pursue new projects or conduct training. Concurrently, MAS had regulations in place to keep up with the changes. Digital bank Licensing and Payment Service Act served to allow digital banks to be established and governs digital payment services, respectively. This ensured that Singapore has adequate legal infrastructure to keep up with the new digitalized economy.

Singapore Budget

Lastly, the Singapore Budget of 2020 serves to overcome the challenges during COVID-19 as well. All in all, the budget tackles the area of job retention, expansion of ICT sector, training and education and business model transformation. A summary is provided in Figure 10.

Figure 10: Singapore Budget and its related initiatives in tackling COVID-19
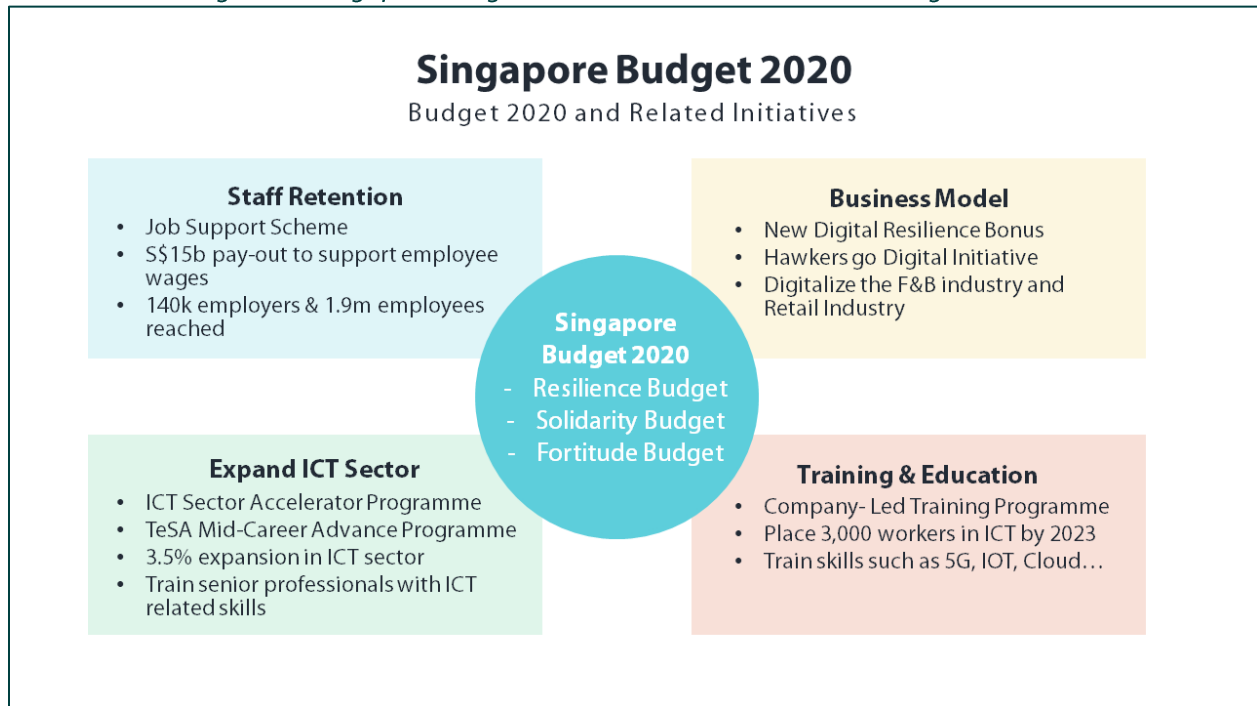
Source: Straits Time, IMDA, MAS, MOF

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B-I-G PROGRAM

The Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA), the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) and the Greater Mekong Subregion (GMS)- B-I-G Capacity Building Program- is a regional capacity development initiative for government officials to enhance capacities in developing policies, programs, and projects that support physical, institutional and people-to-people connectivity in Southeast Asia and the People's Republic of China (PRC). The B-I-G Program provides opportunities for knowledge and experience sharing, and networking between and among the three subregional programs given their unique roles as building blocks for Asian integration. It is funded by the Asian Development Bank (ADB) and the governments of the Republic of Korea and the PRC.

PACER DIALOGUES

Bouncing **B**ack **P**olicy **A**ctions for **C**OVID-19 **E**conomic **R**ecovery **(PACER) Dialogues**, supported by the ADB under B-I-G Capacity Building Program, are organized to share cutting-edge knowledge and best practices that can help "B-I-G" member countries, Singapore and Timor-Leste "bounce back" from the COVID-19 pandemic and accelerate economic recovery.