Blockchain as a financial infrastructure: «China focus»

By Eugenio Reggianini

Introduction

- **13th Five-Year National Informatization Plan**, China set establish national standards, policy frameworks, for blockchain technology to strengthen the innovation, test, and new applications.
- **“Made in China 2025”** national guidelines to create portfolio of national assets to export abroad.
- **People Bank Of China development plan 2019-2021** to strengthen the strategic position for financial technology over a long-term perspective.
- Supporting **One Belt One road overseas investments guidelines**

Standards

Main Operational standards managed by pboc and safe

- China's Cross-border Interbank Payments System (CIPS)
- HVPS . (High Value Payment System) which handles HVPS mainly inter-city and local credit transfers above a given value
- CIPS – HVPS fully compliance with ISO2022

Technichal standards

- Financial Distributed Ledger Technology Security Specification (JR/T 0184-2020)
- specifies the security system of financial distributed ledger technology, basic software, cryptographic algorithms, node communication, smart contracts, privacy protection etc etc..
- Issued by pboc (it is also member of ISO/TC307)

Main authorities overlooking Blokchain as a financial infrastructure (baafi)

- **Cyberspace Administration of China (CAC)***
- **Ministry of Industry and Information Technology (MIIT)***
- **State Administration for Industry and Commerce (SAIC)**
- **People's Bank of China (PBOC)***
- **China Banking and Insurance Regulatory Commission (CBIRC)**

* I am focusing here on CAC, MIIT and PBOC i believe they have the most important operative role

Cyberspace Administration of China (CAC)

- regulate blockchain service providers. All blockchain service providers are required to register with CAC through CAC's blockchain registration system.
- Any new blockchain product is also required to report to CAC or its relevant local authority to conduct a security assessment before launch.
- foreign blockchain company, if it has a legal presence in China and its business meets the definition of blockchain information service providers, or it delegates an entity in China to run its blockchain technology or nodes, then it needs to register with CAC.

Ministry of Industry and Information Technology (MIIT)

01

Evaluate and produce ratings for blockchain projects, organize blockchain technology research projects and blockchain forums.

02

Coordinate Blockchain Service Network national project.

03

Coordinate technical committee for the set up of national standards

People bank of China (Pboc)

1. Regulate financial institutions in China and draft policies to prevent financial risks.
2. Supports dlt education, application, standardization in finance industry.
3. In charge of national pilot projects involving dlt features technology.
    1. Digital Currency Electronic Payment DCEP
    2. Bay Area Trade Finance Blockchain platform BATF
4. Coordinate other private financial dlt applications.

Blockchain Service Network

BSN

Intent

Provide a public infrastructure network that allows the low-cost set up, development, deployment, operation, maintenance and regulation of permissioned blockchain applications.

BSN is a multi-framework, multi-chain, multi-ledger blockchain system.

Each application deployed on a certain number of city nodes uses a dedicated channel for transaction processing, data communication and storage.

Founders

1. **Government Agency**: State Information Center of China.
2. **Communications Industry**: China Mobile Communications Corporation Design Institute Co. Ltd, China Mobile Communications Corporation
3. **Financial Industry**: China UnionPay Corporation and China Mobile Financial Technology Co.,Ltd.
4. **Software Industry**: Beijing Red Date Technology Co., Ltd.

Key parts

1. **Public city nodes**:

Provide system resources such as access control, transaction processing, data storage and computing abilities for blockchain applications.

The project has a starting phase of 200 nodes around China Mainland and overseas locations. BSN International nodes (Tokyo, Paris, Sydney, Sao Paulo) would be linked to the BSN-China network but they would need to operate independently and comply with the laws and regulations of the areas in which they are active.

Key parts

2. Blockchain framework:

The operating system of blockchain applications: BSN supports mainstream blockchain frameworks.

At the moment BSN already supports Hyperledger Fabric being adapted, including Fabric with Chinese SM2/SM3 Encryption, FISCO BCOS, and others. In regard to public blockchain frameworks, BSN currently supports Ethereum and EOS.

Key parts

3. BSN Portal:

It represents a connection to BSN public city nodes. Aside from the purchasing of resources and deploying of applications, all other functions are provided by the portal itself, such as user registration and management, billing and payment systems, and developer communities.

The main goal of the project is to build a network worldwide of city nodes able to interoperate with China for blockchain solutions.

Participants

1. Cloud service providers:

BSN has already international partner like AWS, Google Cloud, Microsoft in addition to China telecom, China mobile, China Unicom, Baidu Cloud.

2. Blockchain framework providers: Hyperledger Fabric, FISCO BCOS, Ethereum etc.
3. End Users: Corporations, BaaS service providers, other developers can deploy applications.

Interoperability and global alliance

- BSN launched global partnership with Chainlink oracles to enable governments and enterprises to incorporate validated real-world data into their BSN applications.
- BSN has recently spilt the system for mainland and overseas operations.

According to internal opinions the intent is to set up a global alliance

(Consortium?)

List of the most influential IT Providers joining BSN network

- Hyperchain - China UnionPay;

Bank customers can send electronic credential with electronic signatures to the platform.

- Alibaba Group - Ant Group;

BaaS” solution on Alicloud Blockchain that is an enterprise-level platform service to build apps.

Ant Group signed a strategic cooperation agreement with pboc for digital transformation.

- Tencent – We bank

Offers BaaS built on Tencent Cloud, We Bank founded FSCO BCOS first Chinese open source blockchain framework and set up many initiatives in Trade – supply chain finance.

List of the most influential IT Providers joining BSN network

- Baidu

Offers BaaS by Baidu Blockchain Engine for SMEs which is supported by Xuperchain protocol (HYP Fabric also).

- Huawei

BaaS supported by the open source solution Hyperledger running gover Huawei Cloud infrastructure and designed for enterprises.

- JD

JD Blockchain Open Platform targeted to enterprise customers. The platform helps companies to build their own applications and host them on public or private clouds.

Digital Electronic Payment System

DCEP

Introduction

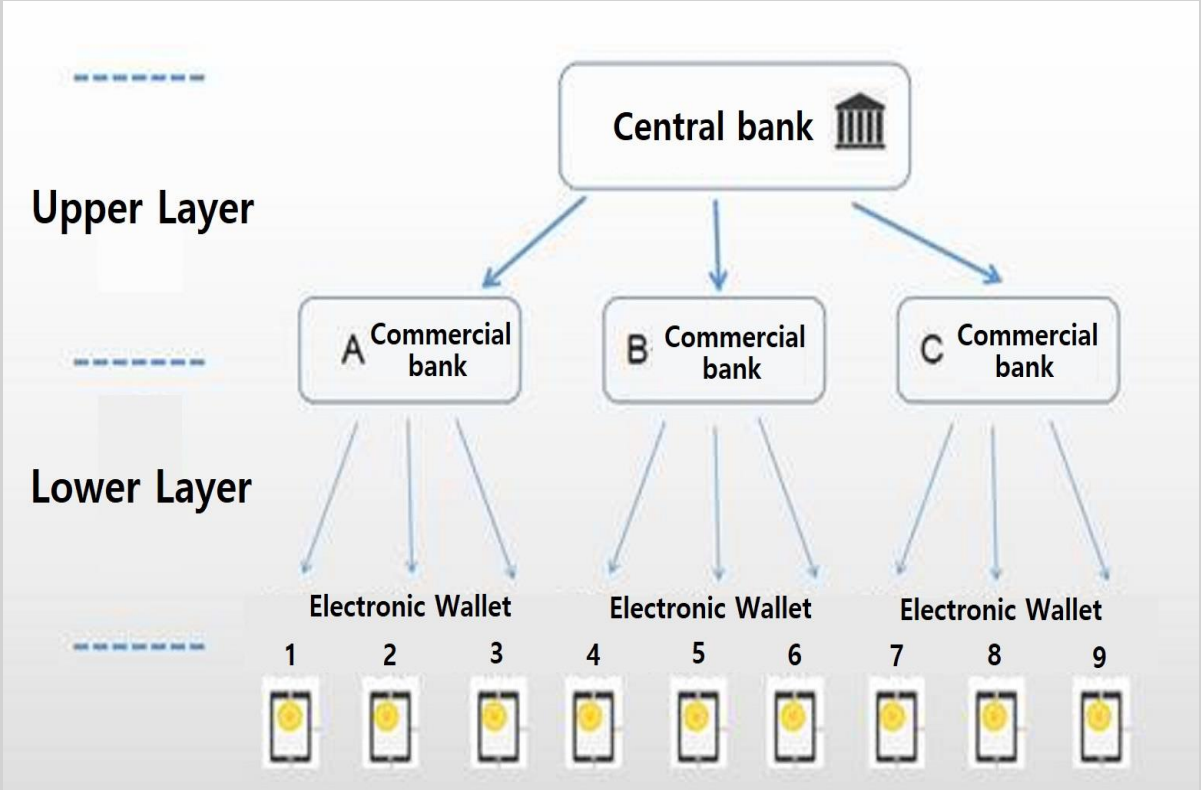
- DCEP is a project run by Central digital currency national research institute of PBoC and will constitute a pillar of Chinese digital finance.
- Among all current CBDC projects in the world, DCEP is the at the most advanced stage.
- China is considered the best environment for set up CDBC in context of highly digitized economy, widespread use of private digital payment services, society's self confidence in using digital identity, and stable governing body.
- Intent is to fully replace paper cash in 10-15 years.

Intent

1. Strengthening financial infrastructure by promoting competition in the payments market.
2. monitoring of fund flows, as well as anti-money laundering/terrorism financing and anti-tax evasion efforts.
3. Internationalization of renminbi.

Key design features

- The aim of DC/EP is to replace M0. DC/EP is backed 1:1 by deposit reserves, pays no interest, and undertakes no social or administrative functions other than the four functions of money.
- The circulation of DC/EP follows the traditional 2-tier system of the central bank and commercial banks. The PBoC issues DC/EP to commercial banks in a wholesale approach. Commercial banks then distribute DC/EP to the public for retail use.
- No interest payment in issuance and redemption.



Registration Center

- The registration center records all DC/Eps and corresponding users. It also records all DC/EP transactions, including the whole life cycle of issuance, circulation, and redemption.
- It is a centralized ledger managed by pboc.
- PKI (Public Key Infrastructure) can be used for authentication of financial institutions or high-end users, while IBC (Identity Based Cryptography) can be used for authentication of low-end users.
- Does not need to run any consensus algorithm.

Token Model managed by centralized ledger

- Loose account coupling embodies a token model managed by a centralized ledger. DC/EP transactions almost do not rely on accounts so DC/EP can circulate in form of “Controlled anonymity”.
- DC/EP transactions information will be only provided to the PBoC. Without its permission 3 parties cannot discover the identity users or trace their transaction history.
- based on the UTXO (unspent transaction output) model.
- structured by hash functions and merkel trees.
- DLT may be used to verify the authenticity of DC/EP, or transactions may be recalled by oracles in dlt solutions.

Wallets

- DC/EP wallets is a pair of public and private keys. The public key is also the address where the digital representation of RMB is stored.
- Wallet are operated by commercial banks but no settlement and no impact on commercial banks balance sheets. Commercial banks are heavily involved in the DC/EP wallet setup and KYC processes.
- The corresponding relationship between addresses and user identity is known only by the PBoC through a KYC process.
- Offline transfers between users and recharge or payments by ATM or mobile POS leveraged by QR code.

Impact on commercial banks

- Commercial banks will play a key role in the issuance and redemption of DC/EP and will provide wallets to users and implement KYC.
- DC/EP is the central bank's liability to the public. So the wallet establishes a custodian relationship between commercial banks and retail users. It is not like a liability relationship. This means DC/EP and the user deposits in wallets are off balance sheet items for commercial banks. DC/EP does not appear in commercial banking balance sheets.
- DC/EP transactions, money movement only involves DC/EP payers, DC/EPpayees, and the PBoC through the DC/EP registration center, possible connection with BSN?

Differences with third payment tools

- Third-party payment follows the tight account coupling model and is not anonymous. In contrast, DC/EP follows the loose account coupling model and achieves “controlled anonymity”.
- Third-party payment is a payment tool. Only users with the same third-party institution can make direct transfers between themselves. In contrast, DC/EP is a legal tender.
- DC/EP will help the PBoC to monitor the flow of funds and enforce regulation such as AML, CFT, and anti-tax evasion.

Settlement

- Settlement via DC/EP Custody and Payment Institutions (CPCPI)

  Users transfer their DC/EP to the CPI's DC/EP wallets, in return they are entitled to the equivalent account balance of these institutions.
- Same user experience as today's third-party payment services.
- CPIs can reduce the pressure of PBoC in processing all DC/EP transactions directly.
- Third-party payment providers can act as CPIs. They can either transfer DC/EP directly to the wallet or refill the wallet with bank deposits which is ultimately reflected as the payment reserves.

RMB Internationalization – 3 scenarios

- **RMB as the Settlement Currency for International Trades.**

When corporations, government departments and other organizations and individuals in China purchase goods and services from overseas with RMB, the RMB deposit balance owned by foreign Institutions and individuals increases. Similarly, when goods and services are purchased from China by foreign Institutions and individuals, their balance of RMB deposit decreases.

RMB Internationalization – 3 scenarios

- **RMB as the Transaction Currency for Cross-border Investments and Financing.**

When Chinese Institutions and individuals use RMB to purchase foreign financial assets, or foreign institutions and individuals buy RMB denominated financial assets, RMB acts as the unit of account and medium of exchange in cross-border financial transactions.

RMB Internationalization – 3 scenarios

- **RMB as an International Reserve Currency.**

When foreign central banks hold RMB-denominated financial assets as part of their official reserve assets, it reflects RMB's role as an international reserve currency. Foreign countries can invest in China or import goods and services from China using their RMB reserve assets. However, they cannot 'bring back' the RMB reserve assets and use them domestically.

International cross-border digital stable currency platform in HK

- “Born” as implementation of the China-Japan-Korea Free Trade Zone resulting package of digital stable coins that can be used in cross-border trade and backed by reserve fund custody system for electronic wallets, to ensure the safety of the operations.
- Financial institutions and large multinational companies will set up nodes pledged by stable coins and the Hong Kong Monetary Authority will conduct real-time supervision through the pledge information on the chain.

Easy business model

- Foreign individuals and Institutions only need to set up DC/EP wallets to participate in RMB cross-border payments. In this way, they establish a direct debtor-creditor relationship with PBOC without involving any domestic or foreign banks as intermediaries.
- Foreign travelers to China can enjoy mobile payments using DC/EPwallets without opening a local bank account in Mainland China. On the other hand, overseas merchants who are willing to accept payments in RMB can set up DC/EP wallets to accept cross-border payments from Chinese travelers.

DCEP – Libra: Comparison

1. Although both DC/EP and Libra adopt a hybrid architecture, dlt application depends on commercial banks. The bottom layer of Libra is a centralized structure, and the top-level settlement uses blockchain technology.
2. DC/EP uses RMB as its asset reserve, while Libra uses a basket of currencies as its asset reserve.
3. DC/EP is an alternative to M0, and does not involve M1 and M2 itself, but Libra can theoretically.
4. DC/EP is issued by the central bank, while Libra is the debtor of the Libra Association.

The pilot project

- In April 2019, the People's Bank of China chose 4 cities (Shenzhen, Suzhou, Hebei, Chengdu) to start a pilot program on the use of DC/EP in domestic payment. In 2022, DC/EP will be tested in the Beijing Winter Olympics. It will mark DC/EP's first step to serve foreign users.
- The pilot project of DCEP is led by the People Bank of China, with the participation of China Mobile, China Telecom and China Unicom, as well as the four state-owned commercial Banks, ICBC, Agricultural Bank of China, Bank of China and China Construction Bank.

The pilot project

- Pboc has set up 3 fintech company in Beijing, Suzhou, Shenzen in order to build up and support the operations in the pilot zones.
- MOFCOM, China Ministry of Commerce announced the launch of the digital currency pilot program in some cities including those in the northern Chinese region of Beijing-Tianjin-Hebei, eastern region of Yangtze River Delta, "Greater Bay Area" around the Pearl River Delta, and some cities in Midwestern China.

Further suggestions

1. How connect dlt solutions (even at national level like BSN) with DCEP?
    1. Oracles can recall DCEP trasactions and collected into on chain dlt solutions?
    2. API could verify DCEP trasactions within dlt solution?
2. Suggested business application scenarios?
    1. The project could expand including medical, education, tourism, and e-commerce services.
3. How managing AML KYC at large scale?

Administrative policies

As of the end of June 2020, 25 of provinces, cities, autonomous regions, and special administrative regions have issued blockchain-related policies.

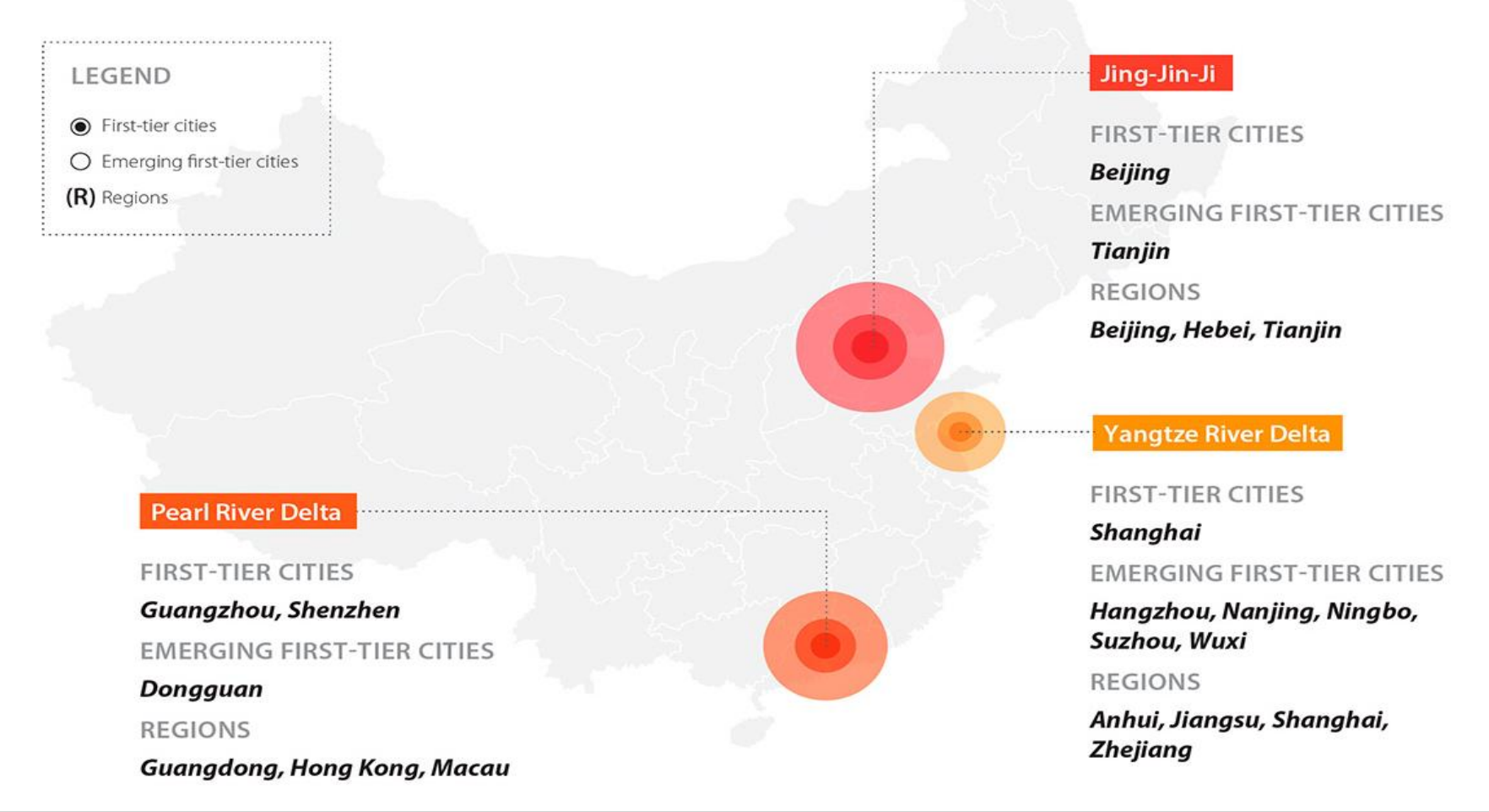
Key strategic development areas

China is driving is leading national economic development by 3 main huge clusters

- Jing-Jin-Ji (Beijing- Tianjin - Hebei)
- YRD (Yangtze River Delta)
- PRD (Pearl River Delta Greater Bay Area)

Technology will support the economies boosting connectivity within and between the clusters. Each cluster has a pivotal municipality which is leading economic development according to NPC plans.

Key strategic development areas



Beijing-Tianjin-Hebei Integration Plan

- Beijing is known as a political, educational, cultural, and R&D center;
- Tianjin is known as northern China’s logistics center, with one of the busiest ports in the world;
- Hebei province is known for its heavy industries, including steel production.

Yangtze River Delta

- Shanghai is a logistics center and mainland China’s financial center;
- Zhejiang and Jiangsu provinces have strong manufacturing bases (eg. marine, new energy vehicles, power equipment);
- Hangzhou is top 3 China mainland technological hub for innovation.

Pearl River Delta Greater Bay Area

- Hong Kong is considered one of the world financial center;
- Shenzhen is known as China's "Silicon Valley" because of its innovation and startup culture;
- Guangzhou is known for its manufacturing industry and as a logistics hub;
- Macau and Zhuhai are known for leisure and tourism.

Suggested goal ?

- Set up a building a seamless data flow running within the national administration network .
- This network will be orientated by BSN city nodes over main backbone connection hubs belonging to local governments for mainland China operations. Other initiatives like DCEP could be recalled within the network.
- At the moment 11 cities (first tiers mainly have released blockchain administrative strategy) and Beijing is taking the lead issuing the Beijing Blockchain Innovation Development Action Plan 2020-2022.

Beijing – the initiatives

- Building a blockchain integrated industrial chain system providing application scenarios support for small and medium-sized innovative companies.
- Create a blockchain innovation and entrepreneurship service platform. Support scientific research institutions, universities and enterprises.
- Set up a blockchain industry investment fund actively support blockchain innovation projects to become bigger and stronger.
- Promote the construction of the blockchain industry alliance (BSN).

Beijing – the pilot projects

- 12 pilot business cases and will promote interoperation between different public administrations.
- The projects involve Jing – Jin – Ji cluster in many industries:
  - Banking
  - Real Estate / Property management
  - Logistics
  - Cross border trade
  - E-government

Shanghai – Blockchain Alliance

- In September 2018, the Yangpu District Government of Shanghai issued Several Policy Provisions on Promoting the Development of Blockchain by twelve supportive policies for the development of blockchain industry within the jurisdiction.
- In January 2019 Shanghai Yangpu District government's press release, Yangpu District set up a blockchain industry fund to support the development of start-ups and high-growth enterprises.
- Municipal Commission of Commerce, and representatives from six commercial banks, including PBOC, set up a Blockchain Alliance proposal for the city's e-port area.

Shenzhen

- 2018, Shenzhen set up a government-led blockchain fund – Shenzhen Blockchain Venture Capital Fund.
- Relying on Tencent technologies enterprises can apply for invoices and declare taxes on the blockchain. After the transaction is completed, the blockchain system automatically generates the content and amount of invoices and makes out invoices in real-time.
- As to August 2020 Shenzhen is the first mainland China to reach 5G fully networking coverage.

Conclusion

- BSN will be the engine, the architecture for «Chinese internazionalization» by Made in China 2020-2025.
- DCEP will provide a centralized management tool for M0 acting as a first financial layer of the economy and BSN will work as cloud architecture supporting dlt solutions provided by chinese corporations for M1, M2, M3.
- This will lead to a fully digitalized finance ecosystem supporting One Belt One Road Initiatives globally creating a system enjoying efficiency of a centralized governance and control, empowered by dlt solutions.

Thank you for the attention !

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