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of International Business**

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Editor's Note

The 42nd issue of the *Comparative Law Yearbook of International Business* addresses a diverse range of topical issues of national and international consequence. Ranging from an analysis of the *pari passu* principle and its operation in corporate insolvency in the UK, to international trends regarding mediation and its future development under the new Singapore Convention, the findings presented in the 10 chapters of this edition will interest both those involved in and those studying the legal regime for cross-border business activities.

Authors from Argentina, Brazil, Colombia, France, Italy, Japan, Poland, Russia, Taiwan, and the United States of America examine a panoply of matters, e.g. relating to anti-corruption measures, arbitration, company law, competition law, financial law and mediation. The comparative analysis serves to highlight the strengths and weaknesses of approaches adopted, in particular jurisdictions by juxtaposing them with their equivalents in others in North America, Europe and beyond.

Thus, for example:

- Public-private partnership possibilities for Brazil implementation of 5G telecommunications.
- Colombia's exchange control for people involved in international transactions with countries subject to exchange control regimes is compared with Argentina and Japan.
- Poland's regulations concerning advertising are illuminated from an entrepreneur's perspective.
- Russian trends regarding international arbitration (involving Russian parties or arbitration seat in Russia) are assessed a, following the country's series of reforms.
- The impact of the Singapore Convention is evaluated, as well as the likely future development of mediation and its interaction with other forms of dispute resolution.
- The role of *pari passu* in corporate insolvency in English law is important for shareholders in UK companies but may have not kept pace with developments in other jurisdictions.

- Corruption and the role of internal investigations and recent innovations in Argentina to tackle to it are examined and compared with approaches in Brazil, the US and Europe.
- The EU directive for cross-border conversions, divisions and mergers is important for stakeholders, creditors, employees who may be impacted by such corporate action and its implementation in Italy is contrasted with that of other EU Members States.
- Taiwan's competition law regime is assessed in connection with issues that are relevant from an international perspective.

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Recent Developments in the Implementation of 5G Technology and Its Benefits

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Introduction

The present chapter examines how the implementation of the communication technology network of “Fifth Generation” (“5G”), combined with partnership instruments between the public and private sectors, can impact the digital transformation and the infrastructure of cities and the quality of life of the population.

The implementation of Fifth Generation technology is moving quickly around the world. This technology will be an essential utility that goes beyond a fast connection, driving the advancement of the “Internet of Things” and “Smart Cities”.

In some countries, regulatory agencies are discussing the most appropriate rules for bidding procedures, with regard to the types, spectrum sizes and radiofrequencies to be allocated to bidders, as well as the appropriate type of corporate entities and business models that may be available as vehicles to be offered and used by the interested bidders.

In Brazil, the telecommunications sector has recently had its regulatory framework changed and plans, soon, to bid for the radiofrequency bands that will allow the implementation of 5G technology in Brazil, which will not only enable citizens to benefit from a faster mobile internet but, in view of the technology designed to support the connection of things and people, will provide a series of new possibilities that directly affect the community such as, for example, better support for the application of the Internet of Things (IoT) in healthcare, logistics, security systems, public and residential lighting systems, and meteorological systems, among others.

However, in a scenario of budgetary restriction by the Government, so that the possibilities arising from this new technology may emerge effectively in cities and society, a partnership between the Government and the private sector may be possible through contractual instruments

that allow the Government to use the experience and resources of the private sector.

In this context, Public-Private Partnerships present themselves as an alternative for the Government to use the participation of the private sector to advance its agendas of digital transformation and smart cities, seeking to overcome its own financial and know-how barriers.

Telecommunication Services

Telecommunication Sector in Brazil — Overview

Telecommunication services in Brazil are the responsibility of the Federal Government as established in Article 21, XI of Brazil's Federal Constitution.¹ Similarly, the Federal Constitution, in item IV of its Article 22, has reserved to the Federal Government the private competence to legislate on telecommunication services.²

Therefore, in Brazil, the exploitation of telecommunication services is exclusive to the Federal Government, even if it is carried out indirectly, and the legislation that regulates the exploitation of such services is exclusively federal.

Thus, in 1997, the Federal Government regulated telecommunication services in Brazil, through the enactment of Federal Law Number 9,472/97, the General Telecommunications Law (LGT), which provides for the organization of telecommunication services, the creation and operation of a regulatory body and other institutional aspects. This Federal Law created the National Telecommunications Agency (Anatel), a special autarchy, whose objective is to organize the exploitation of telecommunication services and to define telecommunication services, as well as to establish the organization for the provision of such services.

Anatel's competence, pursuant to Article 19 of the General Telecommunications Law and its items, is to adopt the necessary measures to serve the public interest and develop Brazilian telecommunications, acting with independence, impartiality, legality, impersonality and publicity.

1 Article 21: "The Federal Government is responsible for: (...). XI — exploit, directly or by means of authorization, concession or permission, the telecommunication services, pursuant to law, which will provide for the organization of services, the creation of a regulatory body and other institutional aspects".

2 Article 22: "It is Federal Government's responsibility to legislate on: (...). IV — water, energy, information technology, telecommunications and broadcasting".

Among other aspects, the main Agency's tasks, provided in the legal provision referred above, are to:

- (1) Implement, within its sphere of competence, the national telecommunications policy;
- (2) Represent Brazil in international telecommunication organizations, under the coordination of the Executive;
- (3) Manage the radio spectrum and the use of orbits, issuing the respective regulations;
- (4) Issue or recognize the certification of products, observing the standards and norms established by it;
- (5) Administratively compose conflicts of interest between providers of telecommunications services;
- (6) Repress violations of users' rights; and
- (7) Exercise, in relation to telecommunications, the legal powers to control, prevent and suppress violations of the economic order, except those belonging to the Administrative Council for Economic Defense (CADE).

In turn, Article 60 of the legal mark³ of telecommunications defines telecommunication services as the set of activities that enables the offer of telecommunications, which is the transmission, emission or reception, by wire, radio electricity, optical means or any other electromagnetic process, of symbols, characters, signs, writings, images, sounds or information of any kind.

The General Telecommunications Law, providing for the organization of services, classified them according to two criteria: First, regarding the scope of the interests they serve, which may be services of collective interest or services of restricted interest (Article 62);⁴ and second, regarding the legal regime of its provision, which may be public or private (Article 63).⁵

³ Article 60: "Telecommunication service is the set of activities that makes it possible to offer telecommunication. Paragraph 1: Telecommunication is the transmission, emission or reception, by wire, radio-electricity, optical means or any other electromagnetic process, of symbols, characters, signs, writings, images, sounds or information of any nature. Paragraph 2: Telecommunication station is the set of equipment or instruments, devices and other means necessary for the realization of telecommunication, its accessories and peripherals, and, when applicable, the facilities that house and complement them, including portable terminals".

⁴ Article 62: "Regarding the range of interests they serve, telecommunication services are classified as services of collective interest and services of restricted interest. Sole paragraph: Services of restricted interest will be subject to the necessary conditions so that their exploitation does not harm the collective interest".

⁵ Article 63: "Regarding the legal regime of its provision, telecommunication services are classified as public and private".

Telecommunication service of restricted interest is that intended for the use by the performer himself or provided to certain groups of users, selected by the provider according to criteria established by it, in compliance with the requirements of the regulation. The telecommunication service of collective interest, on the other hand, is that whose provision must be given by the provider to anyone interested in its enjoyment, under non-discriminatory conditions, observing the requirements of the regulation.⁶

Until recently, the telecommunication service under the public regime could be provided through concession or permission, however, on 4 October 2019, Federal Law Number 13,897 was enacted, which alters the regulatory mark hitherto existing, to establish a new standard for telecommunication services grant from the predominant concession model to the authorization model.

In addition, to implement Number 13,897, on 17 June 2020, Decree Number 10,402 was approved by the Brazilian President, which provides the rules for the adaptation of the concession instrument to the authorization of telecommunications services and for the extension and transfer of the authorization of radiofrequencies, among other topics.

The change to authorization aims to adapt the regulation in the face of technological changes, as the concession institute, widely used for the development of fixed telephony, did not keep up with the technological development that exulted with the advent of mobile telephony, becoming highly costly for telephone companies.

The implementation of these new regulations will have the ability to decrease the regulatory costs of the concession, and also to allow companies to provide services according to demand, therefore stimulating efficient investment in infrastructure in a sector whose technologies need constant improvements and quickly become obsolete.

Provision and Universalization of the Telecommunication Service

With regard to the provision and availability of the telecommunication service, although the LGT establishes that the Government is responsible for ensuring, to the entire population, the access to telecommunications, at reasonable rates and prices, and in adequate conditions; and that providers of telecommunication services in the public regime⁷ must

⁶ ANATEL Resolution Number 73, of 25 November 1998 (approves the Telecommunication Services Regulation).

⁷ Article 64: The telecommunication service modalities of collective interest, whose existence, universalization and continuity the Federal Government itself may undertake to ensure, will be considered as provision in the public regime.

comply with universalization obligations, aiming to allow the access by any person or institution of public interest to telecommunication services, regardless of their location and socioeconomic condition,⁸ the telecommunications infrastructure in Brazil, even today, is inadequate.

The reality of the sector, resulting from the concession model hitherto prevailing, is that there is little competition in the provision of the service, prices are high, operators do not invest sufficiently and the quality of service, as a rule, is unsatisfactory. In addition, Brazil has a huge problem of digital emptiness, as many areas of the country are not covered, resulting in practically impossible access to the Internet.

According to a survey carried out by the Regional Center for Studies for the Development of the Information Society (CETIC BR) released in 2019, 71 per cent of Brazilian households have internet access: 51 per cent of Brazilian households in rural areas have Internet access; and 75 per cent of households in an urban area have internet access.⁹

Nevertheless, it should be noted that the situation described above is gradually changing, as new Internet access technologies, such as the use of fiber optics and direct connection via satellite, emerge. Regarding the latter, it should be emphasized that its use opens up new opportunities for those who live in regions far from large urban centers, as they dispense with the installation of terrestrial infrastructure which requires large investments.

Among the forms of connection used, cell phones (smartphones) are the main means of access to the internet by the population. This is because the technology that was previously fixed has become mobile and the number of mobile phones has increased at an exponential speed, raising the level of connection.

For mobility to be able to expand, changes to the data transmission network are necessary which, with accelerated technological advances, quickly become insufficient. Therefore, the so-called “generations” arise, as the case of the First Generation (1G), Second Generation (2G), Third Generation (3G) and Fourth Generation (4G), seeking to solve connection problems. And even if they are meeting the needs of the moment, in order to support the enormous amount of software and hardware that is

⁸ Article 2: The Government is responsible for: I — ensuring, to the entire population, the access to telecommunications, at reasonable rates and prices, under appropriate conditions. Article 79: The Agency will regulate the universalization and continuity obligations attributed to service providers under the public regime. Paragraph 1: Universalization obligations are those that aim to enable access by any person or institution of public interest to telecommunication services, regardless of their location and socioeconomic condition, as well as those designed to allow the use of telecommunications in essential services of public interest.

⁹ Available at: <https://cetic.br/pt/tics/domicilios/2019/domicilios/A4/>.

emerging, it is necessary to adapt to the new realities. For this reason, the emergence of the concept of Fifth Generation networks (5G) is necessary.

Fifth Generation Network: Its Implementation and Benefits

The Fifth Generation network has been developed to support the growing volume of information exchanged daily by billions of wireless devices worldwide. Its mission is to increase on a large scale the potential of the current network, raising mobile broadband to extremely high standards of connection speed and simultaneous users.

The Fifth Generation mobile networks aim to significantly reduce the communication latency, as well as increase the reach, capillarity and the number of users of the network. In this context, it is important to highlight that one of the benefits that can be seen with the migration to faster mobile access, 5G, is that the use of long-range access networks may have an impact on rural communities and in sparsely populated regions of Brazil, many of which, as explained above, do not currently have access to the Internet or use satellite connections or low-capacity radio links.

In the international scenario, several countries have already implemented, or are implementing, the Fifth Generation network. A Global Mobile Suppliers Association (GSA) review performed at the end of August 2020 recorded ninety-two operators in thirty-eight countries/territories have already launched one or more 3GPP-compliant 5G services.¹⁰

South Korea, after a bid held in June 2018, granted spectrum in the 3.5 GHz and 28 GHz bands for the provision of 5G services. The government of that country provided, on the occasion, a total of 280 megahertz in the 3.5 GHz band and 2,400 megahertz in the 28 GHz band. The companies SK Telecom, LGU + and KT launched their 5G services in several cities in December 2018 for business customers, and in April 2019 these services were made available to other customers by the three operators.

Currently, the country is the leader of the ranking of cities with 5G network,¹¹ being possible to use the new data network in eighty-five cities, surpassing countries like China and the United States. The expectation in that country is to double the spectrum of the 5G network by the year 2026, in order to guarantee sufficient band to respond to the increase in traffic

¹⁰ 5G Market Snapshot August 2020. Global Mobile Suppliers Association (GSMA). Available at: <https://gsacom.com/technology/5g/>.

¹¹ According to the report published by VIAVI Solutions, available at: <https://www.viavisolutions.com/en-us/literature/state-5g-deployments-2020-poster-chart-en.pdf>.

on the 5G networks, simultaneously allowing the use of the spectrum by new industries that may have a 5G base.

It is important to note that South Korea has implemented a series of initiatives to promote an enabling environment for the implementation of the Fifth Generation network through a competitive market. In this regard, it encouraged mobile network operators to simultaneously launch 5G services and share implementation costs, as well as changed local legislation to enable operators to access public equipment in order to install the equipment needed for 5G services.

In China, the implementation of the Fifth Generation network is among the strategic priorities for the country and has benefited from a series of initiatives supported by the State, such as the granting of subsidies and the issuance, by the Ministry of Industry and Information Technologies, of experimental 5G spectrum licenses for the country's mobile network operators (China Mobile, China Unicom, China Telecom and China Broadcasting Network), which, in June 2019, received permission for commercial implementation after the allocation of 5G commercial licenses.

Among these operators, China Mobile has already completed the first phase of implementation of the 5G network, offering coverage in 50 cities, out of a total of 300,000 installations that it intends to reach across the country by the end of 2020. The expectation is that China will be responsible for 70 per cent of global 5G connections in 2020, and the adoption of the Fifth Generation network will increase to approximately 50 per cent in 2025, placing the country among the leaders along with South Korea, Japan and the United States of America.¹²

In the United States of America, for the implementation of the 5G network, a market-oriented approach was adopted, in which the national telecommunications regulator, the Federal Communications Commission (FCC), launched a 5G action plan: “Facilitate America’s Superiority in 5G Technology (5G FAST Plan)”, which is based on three fundamental pillars:¹³

- (1) Introduction of more spectrum into the market, through auction of high band spectrum, provision of more intermediary band spectrum and improvement of the use of low band spectrum;
- (2) Update of the infrastructure policy to encourage the private sector to invest in 5G networks, through the adoption of new rules that will reduce federal regulatory impediments to the implementation

¹² The Mobile Economy China 2020. Global Mobile Suppliers Association (GSMA). Available at: https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/03/GSMA_MobileEconomy2020_China_ENG.pdf.

¹³ The FCC's 5G FAST Plan. Available at: <https://www.fcc.gov/5G>.

- of the necessary infrastructure for 5G and will help to expand the network's reach for a faster and more reliable service; and
- (3) Update of the legislation in order to reduce regulatory obstacles to the implementation of the 5G network,¹⁴ such as, for example, “Restoring Internet Freedom Order”; “One-Touch Make-Ready”; “Speeding the IP Transition”; “Business Data Services”; and “Supply Chain Integrity”.

In the first semester of 2019, the four largest mobile operators in the United States (AT&T, Sprint,¹⁵ T-Mobile and Verizon), launched 5G mobile services, and although 5G services and devices are not yet widely available across the country, operators have established plans to gradually expand their coverage over the next few years. The expectation is that the adoption of the 5G network will accelerate rapidly in the United States, with 24 per cent of connections in the country in 5G networks, rising to 46 per cent by the year 2025.¹⁶

Finally, in the European Union, it is possible to observe initiatives from a large majority of Member States — such as France, Germany, Portugal, Spain, and Austria, among others — in relation to the spectrum bid for the development of 5G in the European environment. However, these countries have recently suffered from delays in their 5G auctions due to the COVID-19 pandemic.¹⁷ In the same vein, the UK had its 5G

¹⁴ Restoring Internet Freedom: To lead the world in 5G, the United States needs to encourage investment and innovation while protecting Internet openness and freedom. The FCC adopted the Restoring Internet Freedom Order, which sets a consistent national policy for Internet providers. One-Touch Make-Ready: The FCC has updated its rules governing the attachment of new network equipment to utility poles in order to reduce cost and speed up the process for 5G backhaul deployment. Speeding the IP Transition: The FCC has revised its rules to make it easier for companies to invest in next-generation networks and services instead of the fading networks of the past. Business Data Services: In order to incentivize investment in modern fiber networks, the FCC updated rules for high-speed, dedicated services by lifting rate regulation where appropriate. Supply Chain Integrity: The FCC has proposed to prevent taxpayer dollars from being used to purchase equipment or services from companies that pose a national security threat to the integrity of American communications networks or the communications supply chain.

¹⁵ On 29 July 2019, the United States Department of Justice authorized the consolidation of T-Mobile and Sprint into an entity called “New T-Mobile”.

¹⁶ The Mobile Economy North America 2019. Global Mobile Suppliers Association (GSMA). Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/03/GSMA_MobileEconomy2020_Global.pdf.

¹⁷ EuroNews. Coronavirus in Europe: Health and finance impacts from COVID-19 derail roll out of 5G. Available at: <https://www.euronews.com/2020/04/06/coronavirus-in-europe-health-and-finance-impacts-from-covid-19-derail-roll-out-of-5g>.

towers burned after online conspiracy theories that linked cell towers to the new coronavirus pandemic.¹⁸

In Brazil, discussions about 5G emerged more strongly in mid-2015, having its peak in 2019, based on the estimate of disclosure of the public notice of what is considered one of the largest radiofrequency auctions in history, with the largest public offer of capacity for Fifth Generation mobile technology in the world: the 5G auction.¹⁹

In this context, the preparation of infrastructure in Brazil for Fifth Generation networks, for the purpose of universalization of the access to mobile telephony and broadband, has become one of the priorities of the Brazilian Government. Therefore, after long discussions, the Ministry of Science, Technology, Innovations and Communications published an ordinance²⁰ with guidelines for the 5G auction, whereby it guides the National Telecommunications Agency to encourage the sharing of infrastructure between telecommunication service providers and indicates coverage goals.

Therefore, on 17 February 2020, Anatel made available for consultation the Bidding Notice for radiofrequency bands that will allow the implementation of 5G technology in Brazil and the consequent expansion of connectivity in the country.²¹

The Brazilian approach to carry out the 5G auction was initially inspired by several international models, considering the Combinatory Clock Auction (CCA), the major model used worldwide for spectrum bid. However, the bidding notice decided to proceed with caution and adopt the traditional auction format used by Anatel, recommending that the other modality could be used as input in future discussions, to improve the regulatory performance of the agency.

18 BBC News. Mast fire probe amid 5G coronavirus claims. Available at: <https://www.bbc.com/news/uk-england-52164358>.

19 Marcos Ferrari, president of Telebrasil, the association of operators in Brazil, said: "It is the largest auction for 5G among those that have already been made around the world for this technology". Available at: <https://www.uol.com.br/tilt/noticias/redacao/2020/02/08/5g-vem-ai-por-que-o-leilao-do-brasil-vai-ser-o-maior-do-mundo.htm>.

20 Ordinance Number 418, of 31 January 2020. Available at: <http://www.in.gov.br/en/web/dou/-/portaria-n-418-de-31-de-janeiro-de-2020-241105488>.

21 The Bidding Notice of 5G Radiofrequency. On 17 February 2020, the National Telecommunications Agency opened the Public Consultation Number 9, on the Bidding Notice for radiofrequency bands that will allow the implementation of Fifth Generation technology in Brazil. The Public Notice proposes the bidding of the 700 MHz, 2.3 GHz, 3.5 GHz and 26 GHz bands. The public notice ended in 17 April 2020 and ANATEL's answer is still pending. See <https://www.ppi.gov.br/aberta-consulta-publica-acerca-leilao-5g>.

In addition, it is possible to notice other differences between the Brazilian approach and the external approach, both in the offer and availability of bands and spectral capacity by countries and in the total bandwidth allocated, with each nation having sovereignty to identify the best use and purposes of the spectrum in its region.

In this regard, it is possible to point out, for example, that, unlike the plans of the 3.5 GHz band in Brazil, in the USA, this band is widely used for military use, especially by the Navy, in communication systems and radars²² — therefore, in the USA, the offer is 100 MHz²³ (3,550 and 3,650 MHz) and, in the future, more 280 MHz,²⁴ while the Brazilian public notice provides for the bid of 400 MHz (3,300 to 3,700 MHz) in this band.

In addition, in Brazil, the 5G auction has certain peculiarities, such as a fairer regional organization, forming blocks that mix profitable areas with less economically interesting areas, to guarantee investment in all regions and avoid monopolies; the priority of bids within the 3.5 GHz band to small providers; and the consolidation of commitments, which must be observed by the companies, with the specificities of the bands involved.

However, the 5G auction in Brazil enables certain points of connection with the international regulatory scenario on the Fifth Generation network, such as the difficulty of dealing with the 3.5 GHz band, which is considered “ideal” for 5G due to the combination of capacity and coverage, but stumble upon the possibility of interference with the extended C band, used to provide TVRO (television receive-only) services, especially in remote regions.

Another visible interconnection is the international cooperation on the 5G spectrum vision, standards and requirements established between Brazil and the European Union,²⁵ including the EU-Brazil Joint Declaration for the development of 5G, signed in the “*Mobile World*

22 National Telecommunications and Information Administration — United States Department of Commerce (NTIA). Moving Closer to Making Spectrum Sharing at 3.5 GHz a Reality. Available at: <https://www.ntia.doc.gov/blog/2018/moving-closer-making-spectrum-sharing-35-ghz-reality>. “In 2015, the Federal Communications Commission (FCC) established the Citizens Broadband Radio Service (CBRS) to accommodate sharing in the 3.5 GHz band between incumbent users — mostly Navy radar systems — and a variety of new commercial users.”

23 Federal Communications Commission — FCC. Auction 105: 3.5 GHz. Available at: <https://www.fcc.gov/auction/105>.

24 Federal Communications Commission — FCC. FCC Expands Flexible Use of the C-band for 5G. Adopted on 28 February 2020. Available at: <https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g>.

25 European Commission International Cooperation on 5G. Available at: <https://ec.europa.eu/digital-single-market/en/5g-international-cooperation>.

Congress” of Barcelona in 2016.²⁶ Furthermore, in 2017, the EU 5G Infrastructure Association (5G IA) and 5G Brazil, a private autonomous project bound to Telebrasil, signed an industrial agreement.

It should also be mentioned that the auction of radiofrequency spectrum for Fifth Generation telecommunication networks (5G auction) was qualified in the Investment Partnership Program (PPI) of the Republic Presidency through Resolution Number 88/2019,²⁷ presenting as justification the need to promote and expand the access and use of telecommunication services, stimulus of competition in the sector, the fundamental role for the creation of smart cities and the unique opportunity for the entry of new telecommunication providers in Brazil, due to the wide international publicity of the bid.

Finally, the international influence on the 5G cybersecurity issue remains evident, especially with regard to the European Union’s “toolbox”,²⁸ which identifies a coordinated European approach, based on a common set of security measures between all Member States, to mitigate cybersecurity risks on 5G networks. This is because the dialogues between the European Union and Brazil converge on this point,²⁹ especially due to concerns about espionage and risks to critical information systems.

Regarding concerns about the companies that will participate in the installation of the 5G network in Brazil, it is possible to verify that the USA exercised a strong campaign, in Brazil and in the world, to discredit the infrastructure equipment offered by the Chinese company Huawei, leading to international vetoes of the participation of the company in 5G auctions.

The US–China trade war directly influenced the 5G auction in Brazil, which discussed the veto of the company due to national security issues, especially after the positioning of the Institutional Security Office (GSI)

26 European Commission — EU and Brazil to work together on 5G mobile technology, 26 February 2016. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_16_382.

27 Investment Partnership Program — PPI. Resolution Number 88, of 19 November 2019. It opines for the qualification of the radiofrequency spectrum auction for Fifth Generation telecommunication networks (5G Auction) in the Investment Partnership Program — PPI of the Republic Presidency. Council Manifestations, Resolutions. Available at: <https://www.ppi.gov.br/conselho1>.

28 European Commission — Secure 5G networks: Questions and Answers on the EU toolbox. Available at: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_127.

29 Valor — Globo.com. EU approaches Brazil for 5G - Block is interested in working together to certify equipment. Available in Portuguese at: <https://valor.globo.com/empresas/noticia/2020/02/05/ue-se-aproxima-do-brasil-por-5g.ghtml>.

on the possibility of Huawei's equipment to compromise data security through backdoors in the system.³⁰

Brazil decided to authorize the use of Huawei equipment in Brazilian territory, but with limits, established by the GSI in Normative Instruction Number 4/2020,³¹ which provides for the minimum requirements for cybersecurity that must be adopted in the establishment of 5G networks.

However, currently, there is no official position of the Brazilian government on this issue: despite having released the Chinese giant's participation in the 5G³² auction, it is necessary to emphasize that the military treaty with the USA,³³ recently signed by Brazil, may in the future make it difficult for Huawei to participate in Brazil's implementation of 5G.

The bidding for radiofrequency bands that will enable the implementation of 5G technology in Brazil will not only allow citizens to benefit from a faster mobile internet, but, in view of the technology designed to support the connection of things and people, will provide a series of new possibilities that directly affect the community such as, for example, better support for the application of the Internet of Things (IoT) in healthcare, logistics, security systems, public and residential lighting systems and meteorological systems, among others.

30 Folha de S. Paulo — UOL, Brazil authorizes Chinese Huawei's participation in the country's 5G. Available at: <https://www1.folha.uol.com.br/mercado/2020/03/brasil-libera-participacao-da-chinesa-huawei-no-leilao-do-5g.shtml>. "Led by General Augusto Heleno, GSI was seen as a resistance frontier to the Chinese for having presented reservations about the risk that their equipment could compromise data security through 'backdoors' in the system".

31 Brazil, Normative Instruction Number 4, of 26 March 2020. Provides for the minimum Cybersecurity requirements that must be adopted when establishing 5G networks. Brazilian Official Gazette: Brasília, published on 27 March 2020. Available at: <http://www.in.gov.br/web/dou/-/instrucao-normativa-n-4-de-26-de-marco-de-2020-250059468>.

32 Latin America Business Stories — LABS, Brazil allows Huawei to participate in 5G network auction — The Brazilian administration certified that the Chinese company meets all the cybersecurity requirements to make a bid. Available at: <https://labs.ebanx.com/en/news/technology/brazil-allows-huawei-to-participate-in-5g-network-auction/>.

33 Folha de S. Paulo — UOL, Brazil and United States Sign Unprecedented Military Agreement — Text needs to go through Congress and provides partnerships supported by US\$ 96 billion fund. Available at: <https://www1.folha.uol.com.br/internacional/en/world/2020/03/brazil-and-united-states-sign-unprecedented-military-agreement.shtml>.

Internet of Things and Smart Cities

Internet of Things

The Internet of Things is, according to the study “*Internet of Things — Strategic Research Roadmap*”, published by the *Cluster of European Research Projects on the Internet of Things*, a dynamic global network infrastructure, based on communication protocols in which physical and virtual “things” have identities, physical attributes and virtual personalities, using smart interfaces and integrated with telematics networks. Things/objects become capable of interacting and communicating with each other and with the environment through data exchange. Things react autonomously to “real/physical world” events and can influence them by processes without direct human intervention.³⁴

For the jurist Eduardo Magrani,³⁵ although there are great divergences in relation to the definition of IoT, it can be defined as:

“an environment of physical objects interconnected with the internet through small and embedded sensors, creating an omnipresent (ubiquitous) computing ecosystem, aimed at facilitating people's daily lives, introducing functional solutions in everyday processes.”

In Brazil, the Internet of Things was regulated by Federal Decree Number 9,854, of 25 July 2019 (Decree Number 9,854/2020),³⁶ which instituted the National Plan of Internet of Things, with article 2, item I of that Decree defining IoT as:

“the infrastructure that integrates the provision of value-added services with capabilities to physically or virtually connect things

34 Internet of Things — Strategic Research Roadmap. Available at: http://www.internet-of-things-research.eu/pdf/IoT_Cluster_Strategic_Research_Agenda_2009.pdf.

35 Magrani, Eduardo, *A internet das coisas*. Rio de Janeiro: FGV Editora, 1st ed., 2018, p. 192.

36 Brazil, Decree Number 9,854, of 25 June 2019. Institutes the National Plan of Internet of Things and provides for the Chamber of Management and Monitoring of the Development of Machine-to-Machine Communication Systems and Internet of Things. *Brazilian Official Gazette*: Brasília, DF, published on 26 June 2019.

with devices based on existing information and communication technologies and their evolution, with interoperability.”

Some possible examples of the application of IoT in current daily life are the automated systems that warn when some food is missing in the refrigerator (in the context of *smart homes*), smart watches that monitor heart rate and walking, autonomous cars, and speed and location tracking of transport fleets, among others.

The interaction between computers, objects and sensors consequently generates information processing on a large scale, within a context of continuous and coordinated hyper connectivity. In this regard, the combination of a large number of smart devices connected with analysis of huge data volumes “big data” brings enormous benefits and challenges to the way we live in society, living with these technologies.

To guide the sustainable and competitive development of the Brazilian economy in relation to IoT, *Banco Nacional de Desenvolvimento Econômico e Social* [The Brazilian Development Bank] (BNDES), in partnership with the Ministry of Science, Technology, Innovations and Communications (MCTIC), developed a study³⁷ for the diagnosis and proposition of a strategic action plan for the country in IoT.

Conducted by a consortium selected through the BNDES/FEP Public Call, Prospecting Number 01/2016 — Internet of Things (IoT), the study aimed to propose public policies of IoT for Brazil, being divided in four stages:

- (1) General Diagnosis and Aspiration for Brazil;
- (2) Selection of verticals and horizontals;
- (3) Deepening and preparation of an action plan (2018–2022); and
- (4) Support to the implementation of the Action Plan.

The study demonstrated that the broad adoption of IoT tends to bring not only economic gains, but also significant social benefits, according to the position of the International Telecommunication Union (ITU), arm of the

³⁷ The study “Internet das Coisas: um plano de ação para o Brasil” [“Internet of Things: an action plan for Brazil”] generated the document “Relatório do plano de ação — Iniciativas e Projetos Mobilizadores” [“Action Plan Report — Rallying Initiatives and Projects”], contained in the reference below. Brazil — Federal Government. Produto 8: Relatório do Plano de Ação — Iniciativas e Projetos Mobilizadores. Joint production between Banco Nacional de Desenvolvimento Econômico e Social (BNDES), Ministry of Planning, Development and Management, and Ministry of Science, Technology, Innovations and Communications — MCTIC. Version 1.1 — November/2017. Available at: <https://www.bndes.gov.br/wps/wcm/connect/site/269bc780-8cdb-4b9b-a297-53955103d4c5/relatorio-final-plano-de-acao-produto-8-alterado.pdf?MOD=AJPERES&CVID=m0jDUok>. Access on 04/02/2020.

United Nations (UN) for the telecommunication sector, which reinforced the IoT's role in helping the world to achieve the organization's Sustainable Development Goals (SDGs)³⁸ through the adoption of innovative applications to deal with challenges associated to hunger, water supply, food safety, environment, sustainable development, and climate changes, among others.

The priority fronts of IoT for Brazil chosen for the referred study, called “verticals”, were:

- (1) Cities, with a focus on mobility, public security, energy efficiency and sanitation;
- (2) Health, with application in chronic diseases, promotion and prevention, management and innovation efficiency;
- (3) The rural area, aiming at the efficient use of natural resources and inputs, the efficient use of machinery, health security and innovation; and
- (4) Industry (manufacture and base industry), encouraging resources and processes, capital goods, inventory and innovation with IoT.

Each environment has specific strategic objectives to be pursued.³⁹ In addition, there are certain transversal themes for all these environments, called “horizontal”, namely:

- (1) Human capital, which defines key aspects in the formation of the Brazilian workforce for the performance in sectors that involve IoT solutions;
- (2) International insertion and innovation, which deals with sources of financing and stimulus to the internationalization of IoT solutions;
- (3) Regulatory aspect, security and privacy for the advancement of IoT; and
- (4) Interoperability and connectivity infrastructure available in Brazil or with greater potential to meet the applications and use of the frequency spectrum in the country.

The IoT action plan for Brazil inspired the institution of the National Plan of Internet of Things through the aforementioned Decree Number 9,854/2019, with the purpose of implementing and developing IoT in

³⁸ United Nations Brazil. Transformando Nosso Mundo: A Agenda 2030 para o Desenvolvimento Sustentável. [Transforming our world: the 2030 Agenda for Sustainable Development.] Available at: <https://nacoesunidas.org/pos2015/agenda2030/>. Access on 04/02/2020.

³⁹ United Nations Brazil. Transformando Nosso Mundo: A Agenda 2030 para o Desenvolvimento Sustentável. [Transforming our world: the 2030 Agenda for Sustainable Development.] Available at: <https://nacoesunidas.org/pos2015/agenda2030/>. Access on 04/02/2020, p. 14.

Brazil, based on free competition, free circulation of data and observing the information security and personal data protection guidelines.

The objectives of the National Plan of IoT can be inferred from article 3 of Decree Number 9,854/2019.⁴⁰

Advice and monitoring of the implementation of the National Plan of Internet of Things is the responsibility of the Chamber of Management and Monitoring of the Development of Machine-to-Machine Communication Systems and Internet — IoT Chamber, which, as provided for in article 7 of Decree Number 9,854/2019, should: monitor and evaluate initiatives to implement the National Plan of Internet of Things; promote and foster partnerships between public and private entities to achieve the objectives of the Plan; discuss with the bodies and public entities the topics of the action plan aimed at identifying solutions to make the Plan viable; support and propose rallying projects; and act jointly with public bodies and entities to stimulate the use and development of IoT solutions.

Smart Cities

According to the definition given by the European Commission, “smart cities” are “places where traditional networks and services become more efficient with the use of digital and telecommunication technologies for the benefit of their inhabitants and their companies”.

Although they are often confused, it is important to stress the difference between digital cities and smart cities. This is because, while the digital cities operate as a kind of “virtual extension” of the city, through the provision of infrastructure and services from Information and Communication Technologies (ICTs), the smart cities comprise the use of smart urban systems for the supply of public policies.

Therefore, the concept of smart cities goes far beyond the use of ICTs for the best allocation of resources, also involving, more comprehensively, the government participation in the creation of smarter

⁴⁰ Article 3: “The objectives of the National Plan of Internet of Things are to: I — improve people's quality of life and promote efficiency gains in services, through the implementation of IoT solutions; II — promote professional training related to the development of IoT applications and the generation of jobs in the digital economy; III — increase productivity and foster the competitiveness of Brazilian companies that develop IoT, by promoting an innovation ecosystem in this sector; IV — seek partnerships with the public and private sectors for the implementation of the IoT; and V — increase the integration of the country in the international scenario, through participation in standardization forums, international cooperation in research, development and innovation and the internationalization of IoT solutions developed in the country”.

urban transport networks, improved facilities for water supply and waste disposal, more efficient forms of lighting, and more interactive and safer urban administration for the ageing population, among other public services for the population that use system and infrastructure integration and interconnection to allow a better social, cultural, environmental, and economic development.

In this same regard, based on the pillars of growing urbanization and digital revolution, the study “Smart cities: Information and communication technologies and the development of more sustainable and resilient cities”,⁴¹ produced by the Brazilian Network Information Center — NIC.br and by the Brazilian Internet Steering Committee — CGI.br, listed 10 components of a smart city, related to four dimensions — Technology and Data, Government, Physical Environment, and Society, namely:

- (1) ICT and other technologies;
- (2) Data and information;
- (3) Institutional arrangements;
- (4) City administration and management;
- (5) Public services;
- (6) Natural environments and ecological sustainability;
- (7) Built physical environments and city infrastructure;
- (8) Governance, engagement and collaboration;
- (9) Human capital and creativity; and
- (10) Knowledge economy and pro-business environment.

In Brazil, the Federal Government has been working in a coordinated way for the development of smart cities, through an inter-ministerial work, the Ministry of Science, Technology, Innovations and Communications (MCTIC) and the Ministry of Regional Development (MDR), with the support of Anatel and BNDES, to create the Brazilian Program of Sustainable Smart Cities.⁴²

At the international level, the International Telecommunication Union (ITU) created the “United for Smart Sustainable Cities” (U4SSC) initiative, with the purpose of stimulate public policies that consider the use of ICTs so that cities become smart and sustainable. Furthermore, it

41 NIC.br and CGI.br. “Smart cities: Tecnologias de informação e comunicação e o desenvolvimento de cidades mais sustentáveis e resilientes”. *Panorama Setorial da Internet, Smart cities*, Year 9 — Number 2, September 2017, page 5. Available at: https://www.nic.br/media/docs/publicacoes/6/panorama_setorial_ano-ix_n-2_smart-cities.pdf. Access on 04/03/2020.

42 Ministry of Science, Technology, Innovations and Communications — MCTIC, *op. cit.*

is possible to glimpse initiatives of the Organization for Economic Cooperation and Development — OECD, which developed actions based on the topic of smart cities, such as round tables;⁴³ and of the Inter-American Development Bank — IDB, which carried out studies on how the use of ICTs can improve the delivery of public services and the results of public policies in areas such as security, mobility and sustainable development.⁴⁴

The concept of Smart Cities is directly related to the IoT, as among the 17 Sustainable Development Goals (SDGs) established by the UN, Goal 11 (“SDG 11”) specifically deals with “Making cities and human settlements inclusive, safe, resilient and sustainable”.⁴⁵

In Brazil, MCTIC has been addressing smart cities in the Chamber of Cities 4.0, one of the priorities of the National Plan of Internet of Things (IoT), through discussions on the best technologies to serve cities and smart applications in different areas to improve the population’s quality of life. The intention is to assess the maturity level of Brazilian smart

43 Organization for Economic Cooperation and Development — OECD. OECD Roundtable on Smart Cities and Inclusive Growth. Available at: <https://www.oecd.org/cfe/regional-policy/oecd-roundtable-on-smart-cities-and-inclusive-growth.htm>. Access on 04/03/2020.

44 Inter-American Development Bank - IDB. Caminho para as Smart Cities — Da Gestão Tradicional para a Cidade Inteligente. July 2016. Available at: <https://publications.iadb.org/publications/portuguese/document/Caminho-para-as-smart-cities-Da-gest%C3%A3o-tradicional-para-a-cidade-inteligente.pdf>. Access on 04/03/2020.

45 In this regard, we highlight the opinion of Maria Cristina Bueti, Adviser of the ITU-T Thematic Group on IoT and smart cities: “When pursuing SDG 11, it should be noted that sustainable urban design and its architectural structures are key elements to improve the living conditions of the population, avoiding inequality and exclusion. The integration of these elements in all sectors of the urban fabric, especially using technologies, is still a challenging perspective. Although ICTs bring new tools for better planning at the stakeholders’ level, the increase in participative communication between citizens and representatives and the good performance of urban services can only be brought by an improved infrastructure set that encompasses an extensive network of interconnected devices, capable to coordinate their activities and to act independently with limited human interventions. Most importantly, with the help of IoT devices and networks, the cities aspiring to SSC can move away from vertical silos segregated from service providers that are functionally oriented — such as energy, telecommunication, water, transportation, health and other service providers — to get closer to new innovative, interoperable and collaborative models that connect these silos, promoting information sharing, integration and intersectoral collaboration for user service and systems interconnection. In addition to their current capabilities within the urban ecosystem for sustainable urbanization, IoT infrastructures must incorporate privacy and security in their operation, which will facilitate the acceptance of this technology and improve our chances of achieving the main goals of SDG 11.” (NIC.br and CGI.br, op. cit., page 10.)

cities and organize an inter-federative work to develop a national plan, with consensus on the concept, regulation needs and infrastructure.⁴⁶

Furthermore, in the IoT Action Plan Report,⁴⁷ there is a booklet of minimum requirements that must be observed so that any Brazilian municipality can apply IoT and start its journey to become a smart city, listing elements such as:

- (1) Existence of political will;
- (2) Minimum local legislation established;
- (3) Coordinated system of local smart governance;
- (4) Multidisciplinary group of public managers trained on a permanent basis;
- (5) Active system to listen to the citizens;
- (6) Incorporation of IoT requirements in public procurements;
- (7) Provide citizens with access to information generated by IoT;
- (8) Share and request sharing of infrastructure with other actors; and
- (9) Recognize and apply existing models of technological reference.

In addition to the basic components mentioned above, IDB⁴⁸ determined that cities should also follow structured and well-defined steps to implement IoT, through the structuring of teams, the realization of comprehensive diagnoses with the participation of citizens, the design of a comprehensive solution with a multisectoral view, the preparation of an implementation plan with a phased timetable, performance indicators and sources of financing, the creation of mechanisms for review and continuous improvement, the implementation of pilots, the search for partnerships (mainly through public-private cooperation) and the evaluation of results.

46 Ministry of Science, Technology, Innovations and Communications — MCTIC. Implantação de cidades inteligentes é tema de audiência no Senado. Published on 02/20/2020. Available at: http://www.mctic.gov.br/mctic/opencms/salaImprensa/noticias/arquivos/2020/02/Implantacao_de_cidades_inteligentes_e_tema_de_audiencia_no_Senado.html?searchRef=cidades%20inteligentes&tipoBusca=expressaoExata. Access on 04/03/2020.

47 The study “Internet das Coisas: um plano de ação para o Brasil” generated the document “Relatório do plano de ação — Iniciativas e Projetos Mobilizadores”, contained in the reference below. BRAZIL — Federal Government. Produto 8: Relatório do Plano de Ação — Iniciativas e Projetos Mobilizadores. Joint production between Banco Nacional de Desenvolvimento Econômico e Social (BNDES), Ministry of Planning, Development and Management, and Ministry of Science, Technology, Innovations and Communications — MCTIC. Version 1.1 — November/2017, pages 53–55. Available at: <https://www.bndes.gov.br/wps/wcm/connect/site/269bc780-8cdb-4b9b-a297-53955103d4c5/relatorio-final-plano-de-acao-produto-8-alterado.pdf?MOD=AJPERES&CVID=m0jDUok>. Access on 04/02/2020.

48 Inter-American Development Bank - IDB, *op. cit.*

Public-Private Partnerships

Historical Context

In the 15th century, with the advent of the French Revolution and, consequently, the appearance of the Liberal State, the idea of the non-interventionist State was strengthened, where freedom and equality before the law would regulate the market. As a consequence, the repudiation of the totalitarian and absolutist State spread.

The Liberal State operated, in a dissociated way, economics and politics, imposing the removal of the State from the economic domain. State non-interventionism resulted in the annihilation of small businesses by large ones, with harmful effects in the economic and social spheres.

Considering that the principles of liberalism, aimed at protecting freedom and equality, proved to be insufficient, the Social State was consolidated after the Second World War, to which the mission of seeking material equality is attributed through intervention in the economic and social order to help the least privileged.

With the overcoming of liberalism and the establishment of the Social State, the individual, who previously did not want the State's action, starts to demand it, since the Social State assumes the responsibility of economic activities, starting to exercise, in addition to maintenance functions of legal order, national sovereignty and security, others activities aimed at social welfare and economic development.

Before the scenario of exacerbated state growth, which jeopardizes individual freedom through increasing intervention, neoliberal discussions arise, in order to adopt a new model: the Democratic State of Law, in which popular participation in the political process, in Government decisions, and in the control of Public Administration is guaranteed.

The concept of a Democratic State of Law was added to the idea of a Subsidiary State, recognizing that the State must abstain from carrying out activities that the individuals are able to exercise on their own initiatives and with their own resources, implying the limitation to the state intervention. On the other hand, in cases where the private initiative is deficient, it is up to the State, through a partnership between public and private, to subsidize it.⁴⁹

⁴⁹ Di Pietro, Maria Sylvia Zanella. *Parcerias na administração pública: concessão, permissão, franquia, terceirização, parceria público-privada e outras formas*. 10th ed. São Paulo, Atlas, 2015.

As a consequence of the subsidiary State, privatizations emerged, an instrument used to reduce the size of the State, inspired by the neoliberal doctrine that advises the replacement of the State by the private initiative, as it is better able to manage commercial and industrial activities.

Privatizations were not enough to end the economic crisis resulting from the bankruptcy of the Social State, giving rise to the figure of the Public-Private Partnership in England, as an alternative to encourage the application of financial resources from the private sector in the development of projects related to the provision of basic services to the society, without immediate compromise of public resources.

In the British model, the employment of the Public-Private Partnership adopted the name “Private Finance Initiative” (“PFI”) and emerged in 1992 as a set of actions adopted to stimulate private capital projects in the provision of public services.

Later, this contracting model spread to other countries. In Brazil, the financial and economic crisis of the 1980s, together with the neoliberal ideas of a minimal State meeting the needs of the society, gave rise to the review of the public procurement model that was hitherto adopted, and Public-Private Partnerships emerged as an alternative to the lack of availability of financial resources and utilization of the management efficiency of the private sector.

Concept and Modalities of PPPs

The Public-Private Partnership (PPP), established in the legal system through Law Number 11,079 of 30 December 2004 (Law of PPPs), is the adjustment made between the Public Administration and the private initiative, having as purpose the implementation and the offer of a project aimed at direct or indirect enjoyment of the community, with the private initiative being responsible for its design, structuring, financing, execution, conservation and operation during the entire period stipulated for the partnership, and the Government being responsible to ensure the conditions of exploitation and remuneration by the private partnership, under the terms agreed, and respecting the portion of risk assumed by the parts.⁵⁰

The legal system provides for two types of partnerships subject to the legal regime of Federal Law Number 11,079/2004, namely, the Sponsored Concession and the Administrative Concession.

50 Marques Neto, Floriano Azevedo. *As Parcerias Público Privadas no Saneamento Ambiental*. Revista Eletrônica de Direito Administrativo Econômico: Number 2 – May/June 2005, Salvador.

The Sponsored Concession is a modality of public service concession that combines, as a form of remuneration to the private partner, the tariff paid by the users under a pecuniary consideration paid by the Government. As in the Common Concession, one of the central concepts of the Sponsored Concession is precisely in the expression “public services”, which is because the objects of the sponsored concessions are, quintessentially, the public services susceptible of exploitation by the private initiative upon delegation, with payment of tariffs by the users, even if the amount is not enough to finance the investments of the concessionaire.

This institute consists of a contracting which, as the name suggests, depends on a financial subsidy, by the Public Administration, in relation to the part of the service to be provided and/or the public work to be performed, being the responsibility of the private sector to bear the remaining costs, by charging a fee from users of services/works. The main difference between the sponsored concession and the common concession, therefore, is that in this case the amortization of private investments is made, in principle, entirely by the fees paid by users, while in the sponsored concession the amortization is made at the same time with fees and funds of the State itself.

In turn, the Administrative Concession, also governed, at federal level, by Federal Law Number 11,079/04, consists of a PPP modality in which the Public Administration contracts the services (public or not) that will be provided by the private sector, being direct or indirect the user of these services. What characterizes this model is that the remuneration of the private sector is made entirely by the Government, there being no fee collection from third parties, even if they benefit from the service provided.

Thus, in general, the Administrative Concession differs from the Common Concession and the Sponsored Concession as it does not have the purpose of delegating a public service, but rather a service of public interest of which the Public Administration is the direct or indirect user. Therefore, the private remuneration will be composed entirely by a consideration paid by the public partner. This is what happens, for example, with the so-called “connectivity” service adopted in some Brazilian states⁵¹ and municipalities, in which the citizen is an immediate

⁵¹ As an example, the State of Piauí implemented the Piauí Conectado project, in which the concessionaire company has the obligation to install 5,000 kilometers of optical fiber, connecting 96 cities and serving 80 per cent of the State's population, being, therefore, paid on a monthly basis by the Government. For more information: <http://www.ppp.pi.gov.br/pppteste/index.php/projetos/contratados/piaui-conectado/>.

beneficiary of the service provided, but it is the Public Administration that assumes the duty to remunerate the activity provider.

Both types — sponsored and administrative — admit the employment of any administrative tasks under the responsibility of the Government that do not involve the functions of jurisdictional regulation of the exercise of police power and others that are the exclusive competence of the State. However, with regard to these activities that are not delegable to the private partner, the use of these modalities of employment is permitted to carry out the intermediate activities necessary to achieve the final activity: traffic engineering with the installation of electronic speed bumps, traffic lights, and static radars, necessary for the exercise of the police force (inspection).

Regardless of the modality adopted, Public-Private Partnership contracts are instruments that allow immediate investments by the private sector, with dilution of the payments of these investments, by the Government, to one of the project's life cycle, which may vary from five to thirty-five years, during which the operation, maintenance and exploitation of the infrastructure will be up to the private sector.

It is important to highlight that projects can only be an object of the Public-Private Partnership if there is the transfer of obligation of the execution of infrastructure to the private entity (whether a project or the provision of equipment) and also the exploitation and management of the activities resulting therefrom. In other words, the sponsored or administrative concession must necessarily have as its object the provision of an infrastructure (whether new, upon its establishment, or already existing, upon reform) and its respective operation and maintenance.

Finally, it is important to note that the magnitude of the investment is not necessary to achieve the undertaking that will lead to a sponsored or administrative concession. The definition for this modeling should be based on a technical study that demonstrates the convenience and the opportunity of contracting, by identifying the reasons that justify the option for the form of Public-Private Partnership.

Benefits of PPPs

Before the Public-Private Partnerships, there was no legal instrument that would allow the signing of long-term contracts between the Government and the private initiative, whereby payments could be provided from the former. Until then, contracting that involved periodic payments by the Public Administration was limited to sixty months.

The edition of the Law of PPPs legitimized the Government's right to enter into long-term contracts,⁵² providing it with the possibility of full or complementary payment to the private partner and allowing it to dilute the consideration for private investment over the contractual term.

In addition, as explained in the topic above, PPPs are presented as an alternative and efficient method of investing in infrastructure, through the application of financial resources from the private sector in the financing, development and operation of projects related to the provision of basic services, without immediately compromising state resources.

In this regard, another benefit resulting from the adoption of this model is that it allows the public sector to overcome budgetary barriers that hinder investments in infrastructure and use the private financing alternative.

Another attraction of PPPs refers to the gain in efficiency from two perspectives: (i) the participation of the private initiative tends to bring more efficiency to the provision of services, so that the Government benefits from the means of production and know-how of the private initiative; and (ii) efficiency gains related to the comparison of costs between a traditional contracting⁵³ and a PPP contracting, due to the efficient allocation of risks, which follows the logic of risk allocation according to the parties' ability to manage them, in case they occur.

Thus, in light of the foregoing, in a succinct and non-exhaustive way, it is possible to highlight among the benefits arising from Public-Private Partnerships, the possibility to enter into long-term contracts in which the Public Administration pays directly the private entity responsible for financing the infrastructure, allowing the dilution of the capital cost of its implementation throughout the life cycle of the project, as well as the utilization by the Government of expertise of the private sector and the efficiency gain resulting from the appropriate allocation of risks.

Public-Private Partnerships as a Tool for the Implementation of Smart Cities

The concept of smart cities seeks to understand urban centers from the idea of greater inclusion of citizens in social life, as well as promoting significant changes in the relationship between individuals and cities. This is mainly due to the use of technological tools to facilitate citizens' lives.

⁵² The possibility of entering into long-term contracts by the Public Administration was already provided for in Federal Law Number 8,987, of 13 February 1995 (Concessions Law). However, in the common concession contracts, the remuneration of the private sector occurs essentially through collecting fees from users of the services.

⁵³ Contracts of public work or service provision, whose term is limited to sixty months.

In the scope of Public Administration, the main aspect of the smart city is related to the efficient use of public resources through city planning and the possibility of integration between the demands of its population and the performance of public agents. In these cities, public expenditure takes place in a sustainable manner, with the articulation of solutions that seek improvements in the quality of life of its inhabitants. It is not just about bringing computer technologies to the city, but there is concern for the quality of life of citizens.

However, the implementation of technological solutions is not a constant guideline within the scope of the Public Administration and, as a rule, the technology is developed by the private sector, which shares it with the Government through contractual arrangements.

Moreover, the development of a smart city, in addition to not being simple given all the complexities and specificities involved, requires huge investments (for example, for the purchase and installation of LED luminaires for the entire city, smart traffic lights for the entire city, surveillance cameras, presence sensors, traffic sensors, trash sensors, and management software, among others) that public entities do not have, given their budget limitations.⁵⁴

Therefore, it can be verified that, in face of a context in which many urban areas are fighting to keep pace with the accelerated growth, with the constant increase in congestion, reduction in the quality of life, loss of economic potential and negative outcomes in health, and with their governments having limited budgets, Public-Private Partnerships are presented as an alternative to attract investments and technological management capacity in the private sector, as in this concession model, the private entity is responsible for making the investments, and the Public Administration benefits from the experience and know-how of private entities, which are essential for the integration of the necessary structures for a smart city.

54 A study published by Deloitte, entitled "Using public-private partnerships to advance smart cities", states that "From initiatives that aim to improve public health and expand access to Wi-Fi internet to initiatives to promote affordable housing, municipalities are creating innovative partnerships to improve the quality of life of their residents and as a means of reforming and modernizing old infrastructure assets. Their experiences show how cities can overcome traditional barriers to funding and financing smart city projects by demonstrating new technology's potential to reduce costs, recycling existing and legacy infrastructure assets, unlocking value, and bringing a critical mass of players together to spur economic development". This study is available at <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Public-Sector/gx-ps-public-private-partnerships-smart-cities-funding-finance.pdf>.

In addition to the reasons above, two other factors of maximum relevance that motivate the use of Public-Private Partnerships in the development of smart cities should be highlighted: availability and quality of services.

The first one concerns the deadline for the delivery of operational structures by the private sector. The Public-Private Partnership Law establishes that the consideration payment to the private sector is conditioned to the service availability, even if it is an enjoyable portion.⁵⁵ This forecast encourages the private sector to deliver the operational structure as quickly as possible, as it only begins to have a return on its investments from this delivery.

The second factor refers to monitoring the performance of the private company during the execution of the contract. This is because the Public-Private Partnership contract must establish certain performance indicators or criteria,⁵⁶ which will be measured during the execution of the contract, as a way to guarantee the quality in the service provision.

As the author Vitor Antunes Amuri⁵⁷ explains, in a Public-Private Partnership⁵⁸ for the development of the so-called Smart City:

“The responsibility to equip and maintain the network, permanently, in perfect working condition, generating the necessary inputs for decision-making by the Municipal Government in relation to the public utilities connected thereto, will be of a private partner, who will be entitled to the remuneration based on its performance.”

55 Article 7: “Public Administration consideration will necessarily be preceded by the availability of the service, object of the public-private partnership contract”. Paragraph 1: “It is allowed to the public administration, under the terms of the contract, to pay the consideration related to the enjoyable portion of the service, object of the public-private partnership contract”.

56 Article 5: “The clauses of public-private partnership contracts will comply with the provisions of Article 23 of Law Number 8,987, of 13 February 1995, as applicable, and must also set: (...). VII — objective criteria for assessing the performance of the private partner. Article 6, Public Administration consideration in public-private partnership contracts may be made by: (...)”. Paragraph 1: “The contract may provide for the payment to the private partner of variable remuneration bound to its performance, according to goals and standards of quality and availability defined in the contract”.

57 Antunes, Vitor Amuri. *Parcerias Público-Privadas para Cidades Inteligentes*. Available at: <http://www.pppbrasil.com.br/portal/content/artigo-parcerias-p%C3%BAblico-privadas-para-cidades-inteligentes>.

58 For PPPs of Public Lighting, the administrative concession modality is adopted, considering that the community is the direct user of the services.

But how to implement smart cities based on Public-Private Partnership contracts?

With regard to the implementation of the projects themselves, what has been observed is the use of public lighting parks by municipalities, as a way of applying creative solutions for integrating networks and efficient use of urban space, as was done, for example, by the city of Belo Horizonte, Minas Gerais, the first capital of Brazil to operate this type of concession.

The Public-Private Partnership contract for the public lighting park in that municipality had the purpose of replacing 182,000 sodium vapor luminaires with new LED luminaires, of which at least 20 per cent should adopt a tele-management system that allows monitoring by the Control Center and, also, the incorporation of other technologies, such as Wi-Fi internet and cameras, among others, aligned with the concept of Smart Cities.⁵⁹

At the international level, there are several examples of cities that use the public lighting network to integrate smart solutions. Among these cities, Barcelona,⁶⁰ in Spain, is perhaps the most emblematic, having received, in 2014, the title of “Smart City” due to a project developed by the municipality that, integrating public lighting, electric vehicles, public internet (Wi-Fi), and temperature, humidity and pollution control on public roads, enabled the optimization, on sustainable bases, of these services and utilities offered to citizens.⁶¹

59 Available at: <http://pbhativos.com.br/concessoes-e-ppps-2/ppp-iluminacao-publica-2/>.

60 <https://ajuntament.barcelona.cat/digital/en>.

61 Antunes, Vitor Amuri. *Parcerias Público-Privadas para Cidades Inteligentes*. Available at: <http://www.pppbrasil.com.br/portal/content/artigo-parcerias-p%C3%BAblico-privadas-para-cidades-inteligentes>. The implementation of the Smart City in Barcelona started with the installation of LED luminaires on public roads. Then, the luminaires were equipped with sensors capable of capturing information about the environment (temperature, humidity, pollution), as well as identifying noise and the presence of people on the public road, allowing the communication of this equipment with the control cabins installed on the roads, which centralize other services, such as the public network of optical fiber, public Wi-Fi internet and rental and recharging stations for electric vehicles. All information is sent to an Operational Control Center, from which it is possible to monitor and intervene in all these services and activities. The sensors are able to adjust the luminescence level of the LED luminaires depending on the time and flow of people on the public road.