

# **NATIONAL STRATEGY FOR THE DEVELOPMENT OF THE INFRASTRUCTURE FOR BROADBAND CONNECTIVITY IN CUBA**

**(Source: Republic of Cuba, Ministry of Communications)**

## **EXECUTIVE SUMMARY JUNE 2015**

### **INTRODUCTION**

The project of National Strategy for the Development of the Infrastructure for Broadband Connectivity in Cuba “constitutes the policy line to follow for the development of the infrastructure that will serve as support for the implementation of an integral policy for perfecting computer access in Cuban society.”

The fundamental objective of the National Strategy is to organize, regulate and trace the lines for the integral development of Broadband in Cuba. Consequently, it will serve as a guide for national entities and the population, in the development, exploration and utilization of communication services. The range of the objectives, features and goals of this strategy will be put into place in the period of 2015 to 2020, in the framework of a projection up to the year 2030.

The vision of this work is to augment the impact of telecommunications/information and communications technology (ICT) on the transformation and modernization of the Cuban economy and society, through the efficacious and intensive use of new technologies for the population, the business sector and the institutions of the State and the Government, within the scope of reasonable security.

The International Union of Telecommunications (IUT) has recommended the promotion in countries of the development of Broadband as an element conducive to economic prosperity and an increase in productivity, proposing goals to be reached by the year 2020, in the framework of the program “Connecting 2020.” More than 160 countries have outlined their plans or strategies for Broadband.

The Executive Summary that is presented here has been developed from the original document of 83 pages that details with greater precision the aspects addressed. The National Strategy has been outlined by a Working Group chaired by Mincom with the participation of agencies of the Central Administration of the State.

The final version was submitted for consultation to 48 national bodies, agencies and entities, and they took into account the 46 criteria issued during the process.

Definition of Broadband for Cuba.

Broadband is defined as the technology of transmission of data that permits the download of content, data, voice and video, including simultaneously, with a capacity of connection of at least 256 kb/s.

Broadband in Cuba should evolve in the period 2020-2030, foreseeing an Advanced Broadband in 2025 (2048 kb/s of download) and Total Broadband in 2030 (10 mb/s of download).

Guidelines 116, 118, 131, 223 and 226 for the economic and social policy of the Party and the Revolution establish the development of the necessary infrastructure for the sustainable development of the country, the process of computerization of society and technological sovereignty.

Objective No. 52 of the First National Conference of the Communist Party reaffirms the need for approval of the ICT, as a tool for the development of knowledge, the economy and political and ideological activity.

At present, as part of the implementation of the Integral Policy for perfecting the computerization of Cuban society, the Minister of Communications outlines a set of laws related to Broadband, and, in particular, to the Law of Telecommunications/ICT and the Legal Decree of Computer Science/ICT and its complementary rules.

1. Conceptual framework.
2. Legal framework. Agreement with the policies of the country.
3. Diagnosis of the status of Broadband in Cuba.

The following table shows the situation of Cuba in relation to the rest of the world.

CONCEPT	% PENETRATION CUBA	REST OF WORLD
Fixed Broadband/100 inhabitants	0	170 of 190
Mobile Broadband/100 inhabitants	0	135 of 138
Homes with Internet access	3.4	113 of 132
People using Internet	25.7	119 of 191

A diagnostic of the telecommunications/ICT took into account the condition of the telecommunications networks in the country that are the strongest, which are those of ETECSA, the Electric Union, the railway system, MINFAR and MININT. The principle problems identified were the following:

On the fixed network:

Weak infrastructure of connectivity for access (last mile) and in the territorial networks.

Reduced capacity in the national network to support demand for Broadband.

The local fiber optic cables don't have sufficient capacity and there are no territorial networks of high capacity.

On the mobile network:

Reduced capacity of bandwidth in the connectivity of base stations to support a demand for Broadband.

Low density of base stations to assimilate the demand for services.

With the objective of organizing the availability of the frequency spectrum for the services of wireless Broadband communications, they identified the segments that are assigned with a view to organizing and optimizing the use of this natural medium for future services.

The frequencies are assigned as follows:

Bandwidth of 900 MHz for second-generation (2G) GSM technology for voice service.

Bandwidth of 900 MHz (1 channel of 5 MHz) for HSPA technology of third generation (3G) for data services.

Bandwidth of 850 MHz for GSM (2G) technology for roaming voice services and for GSM-R (2G) for railway service communications.

Bandwidth of 1800 MHz for Broadband (e1 TE) trunk service for MININT.

Bandwidths of 2.4 GHz and 5 GHz for WIFI wireless technologies.

They identified the principal barriers – conceptual, economic, technological, regulatory and organizational – that stop the development of these services in the country, among which follow the most significant:

There is no consciousness about the benefit that the use of Broadband introduces in the increase in efficiency and the effectiveness of societal processes, in particular its impact on the growth of GDP.

The levels of investment have been insufficient, including the constructive capacity and execution of Cuban businesses to guarantee the deployment of the infrastructure.

Insufficient connection infrastructure (last mile).

A high level of obsolete technology in all layers of the network, which limits its development and use, including the guarantee that it will function.

Reduced capacity in the connection of base stations for Broadband.

Scarce infrastructure for guaranteeing the investigation and development of the telecommunications/ICT sector.

The high cost of terminals that use the services provided by Broadband.

There is only 24.1% penetration of telephone fixed lines in homes, and 21.4% mobile phone penetration.

Although there are 22 ministry regulations for Broadband, the present situation is not adequate.

National Strategic Goals for Broadband in Cuba.

Specific goals and objectives for the development of Broadband in Cuba.

Goal No. 1: In accordance with the global goals and objectives adopted by the UIT for developing countries, the indicators of the present state of telecommunications in Cuba, the diagnosis, the capacity for execution and financial possibilities that are planned for implementing the policy of computerization, the specific goals and objectives for the development of Broadband in Cuba are developed as follows:

Assuring the connection of a Broadband that requires the process of secure computerization of Cuban society.

Achieving 100% of Broadband connectivity by 2018 in the Party entities on national, provincial and municipal levels; the State agencies, the Central Administration of the State and its dependencies on national, provincial and municipal levels; and in the Assemblies and national, provincial and municipal People Power administrations, to assure the interest of the digital government (e-Government) the government-government (G2G) segment.

Achieving 100% of Broadband connectivity by 2018 in bank institutions and post offices.

Achieving 90% of Broadband connectivity by 2020 in the Higher Agencies of Business, in State and non-State businesses, industries and other centers of production and services, in the interest of increasing efficiency and effectiveness in the production processes as well as in the administration of human resources, materials and finances.

Achieving 80% of Broadband connectivity by 2020 in the entities and commercial establishments of State and non-State sectors, in the interest of viable transactions, bank transactions and electronic commerce.

Achieving 95% Broadband connectivity by 2020 in health and educational centers as well as in scientific, cultural and sports institutions.

Achieving 100% Broadband connectivity by 2020 in the points of presence of the electronic government on the provincial and municipal levels and the popular councils (government-citizen segment).

Goal No. 2: Accomplishing universal citizen access to services offered by Broadband networks.

Reaching no less than 50% of Broadband access for homes by 2020 (1,942,950).

Reaching 95% of Broadband Wireless access by 2020 in provincial capitals and urban zones, and 90% in rural zones.

Reaching 60% of penetration of mobile services by 2020 for the Cuban population (6,651,563 users), of whom 60% (3,990,938) will have the capacity to access the Internet by mobile Broadband.

By 2020, access to Broadband with a speed equal to 256 kb/s will not cost more than 5% of the average monthly salary of the Cuban people

By 2020, to satisfy no less than 90% of the demand for Broadband services requested by the Association of the Disabled and Blind, Deaf and Hard of Hearing for disabled persons.

Goal No. 3: Confronting environmental and security issues.

Achieving by 2020 an intermediate level of preparation for cybersecurity in accord with the World Indicators of Cybersecurity approved by the UIT.

Putting in place by 2020 a system for stable recycling of electronic waste.

Reducing by 30% in the period 2015-2020 the relationship between energy consumption of the telecommunications/ICT infrastructure and the annual traffic of data, with the objective of reducing the environmental impact of the technologies.

Directing, improving and adapting to the changes of the environment of telecommunications/ICT.

Goal No. 4. Achieving 100% connectivity by 2017 for universities and centers of research at the National Network of Education and Research, 70% with a speed not inferior to 2mbt/s for end-users and 30% remaining with no less than a speed of 256 kb/s.

Goal No. 5. Initiating in 2018 the operation of a National Network of Education and Research and its interconnection through the Latin American university network, and to the rest of the education network of the world, which will permit forming an effective association and environment of telecommunications suitable for innovation.

Guidelines for the technological model and its implementation:

The guidelines for the development of a technological model define the infrastructure that is required for the provision of the proposed services.

As a strategic element, achieving a synergy in the optimal use of the economic resources invested for the country in the different sectors, thereby avoiding duplicate investments.

The priorities identified are the following:

1. Strengthening the networks of access with the use of available technologies in correspondence with the particularities of each territory or locality.
2. Developing the networks of aggregation of telecommunications traffic in the provinces and cities, in the interest of increasing the capacity of the network of access.
3. Expanding the capacity of the national fiber optic network in correspondence with the demand for bandwidth that will be increased in each period.

For the implementation of the national strategy of bandwidth, 23 general actions have been identified for the period 2016-2020.

In addition, 28 specific short-term actions, and 10 medium- and long-term actions have been proposed.

Organizing:

1. Prioritize the investments and services associated with guaranteeing the integral security of Broadband in the country, working with the philosophy that supervision and security are indispensable conditions for its implementation.
2. Strengthen the executive capacity of the telecommunications networks of national businesses.

3. Increase the formation and ability of specialists at all levels, prioritizing the subject of security.
4. Diversify the entities that present Internet services to the public with models of relationship with the telecommunications operator, to incentivize the provision of services with priority in the social sector.
5. Elaborate the policy for the optimal use of fiber optics including those that are deployed and new ones.
6. Organize the gradual migration to the Internet protocol IPv6, in the layer of access as well as in transportation.
7. Update the cost, in the interest of making Broadband services more affordable for the population.
8. Begin the study and preparation for the introduction of the fourth generation (4G) in the mobile network in zones of high demand for data traffic, to accomplish larger bandwidth.
9. Evaluate the feasibility of gradually producing in Cuba terminals with affordable prices that support the services of Broadband integrated into computer applications.
10. Incorporate in the constructive regulations that are established by the Institute of Physical Planning for the design of buildings and communities the technical requirements for the deployment of fiber optic networks and other means for telecommunications.
11. Achieve the deployment of base stations for Broadband mobile telephone in the capital of the country and in the provincial capitals, prioritizing those where fiber optic connections already exist.
12. Begin to offer Internet access with 3G technology for national users as well as the deployment of WiFi networks, prioritizing Havana and the provincial capitals in areas of high usage.
13. Use the technology of access by copper cables (xDSL) in those areas where copper networks exist with the appropriate technical conditions.
14. Start the deployment of fiber optic network to the end-user (FTTx) in modes of fiber optic to buildings (FTTB), to offices (FTTC) and to houses (FTTH), prioritizing those areas where there are no other telecommunications services.
15. Provide national fiber optic, according to demand.
16. Gradually strengthen, according to demand, the international transmission network in the total migration to IP technology;
17. Evaluate the use of other wireless technologies to offer connectivity in rural areas, prioritizing the sectors of education and health.
18. Develop the National Network of Education and Research and its connection with international networks of education and research.

19. Adapt the regulatory framework to the new scenarios and the introduction of new technologies.

20. Establish the band of frequencies of 1800 MHz (3 channels of 20 MHz) for the deployment of technologies of the third and fourth generation (3G and 4G), fundamentally for urban zones of high population density.

21. Reserve a segment of the band of frequencies of 1800 MHz for the deployment of 3G and 4G technologies in the interest of roaming that use the bandwidth of Advanced Wireless Services (AWS);

22. Reserve the band of frequencies of 700 MHz for the deployment of 3G and 4G technologies, as a result of the frequencies that are free in the process of the shutdown of analog television, taking into account the characteristic of a large coverage with a lesser number of base stations. The priority of usage of this band will be the connectivity in urban zones of high population density and rural zones.

23. Elevate the capacity of construction and assembly of telecommunications networks for national businesses according to the demand of the projects, with the objective of assuring the deployment of the infrastructure.

24. Use capacities of telecommunications transport in the networks of the State entities that have deployed fiber optics, to complement the networks of ETECSA (UNE, MITRANS, MINFAR, MININT and others).

25. Establish synergy between the planning of telecommunications projects and the national industry of hardware and informatic applications, utilizing and integrating solutions that elevate the sovereignty of the country and its technological development.

26. Evaluate the feasibility of the creation of at least one new Internet point of exchange (node).

27. Revise the policy for prices and the importation of computers, telephones, smart phones and other devices for access.

28. Study and propose the indicators that permit an adequate measurement of the development of Broadband in the country, taking into account the international regulatory framework and our peculiarities.

#### Proposed Resolutions:

1. Approve the proposal of the “National Strategy for the development of Broadband” as a public document that traces the reasons for the deployment of the infrastructure that would support the implementation of the policy of secure informatization of the country.

Responsible party: Council of Informatization and Cybersecurity.

Date of completion: June 22, 2015.

2. Develop the work schedule for the implementation of the National Strategy for the development of Broadband in Cuba.

Responsible party: MINCOM

Date of completion: October 2015.

## ADDENDUM

Specific actions for the implementation of the National Broadband Strategy; specific short-term actions (2015-2016).

1. Continue the deployment of smart telephone stations and networks of flexible copper, maintaining as a policy that they guarantee services of fixed-line telephone and data, prioritizing this deployment in the areas where no other type of service exists.
2. Prioritize the deployment of the provincial and municipal networks, guaranteeing the bandwidth required for the connectivity of the base stations with 3G and 4G technologies as the controllers of access to the WiFi networks.
3. Begin the deployment of wireless technologies (xDSL) in those areas with flexible copper networks.
4. Begin the deployment of the last-mile fiber optic networks (community, building, home) with the use of passive fiber optic technology (GPON), prioritizing those areas where no other services exist and those in which the socio-economic impact will be greatest.
5. Incorporate into the network new flexible and compact technologies that will facilitate its rapid deployment and avoid minor costs and civil constructions of high complexity.
6. Begin the gradual migration of the present services switched from low speed to Broadband.
7. Achieve the deployment of 3G base stations in the capital of the country and the provincial capitals, prioritizing those in which fiber optic connectivity exists.
8. Begin the deployment of WiFi networks prioritizing the capital of the country and the provincial capitals in areas of high density of users.
9. Locate 3G base stations on the trunk line of the railway with the objective of benefiting from the existent infrastructure on those sites and guaranteeing this service to the surrounding localities.
10. Evaluate the use of regional wireless networks (standard IEEE 802.22) to offer connectivity in rural areas, prioritizing those links for the sectors of education and health.
11. Guarantee that the technologies acquired beginning in 2015 will assure their migration to the standards of 4G or higher.
12. Install base stations of new generation in the zones of high traffic of voice and data, reinstalling those that are substituted in rural zones, to temporarily guarantee voice and data in those places with insufficient coverage.
13. Begin the study and preparation of the network.
14. Introduce mobile 4G in zones of high demand for data to achieve better bandwidths.

15. Prepare the migration of the network of interconnection of the base stations to IP technology, leaving the present technology as redundancies with the central node of the system.
16. Prepare and implement the transfer of voice services from the 2G network to the 3G network.
17. Begin to offer to nationals the service of mobile Broadband access to the Internet on the 3G network.
18. Achieve and expand the capacity of the Principal Network in correspondence with demand.
19. Carry out the deployment of territorial networks (provincial and municipal) in the base of fiber optic networks of greater bandwidth and flexibility of connection.
20. Update the technical protocols that permit the routing of the transmission packet.
21. Gradually strengthen, according to demand, the advanced Network of International Transmission in the total migration to IP technology.
22. Consider in the process of migration of the control of the network to the subsystem of multimedia services the technological elements necessary for the increase of Broadband services.
23. Acquire the necessary means (equipment and programs of application) for the measurement and control of the quality of the services that are offered.
24. Update the signaling plans, assignment of IP addresses, synchronization, assignment of frequencies and transmission.
25. Periodically update the system of management of all the layers of the network that compose the Broadband infrastructure.
26. Create a security certification entity for the technology and computer applications or assign this mission to a related State entity.
27. Boost the study of telecommunications and computer specialties, and subjects of security for the technologies of telecommunications/ICT.
28. Prioritize the formation and training of specialists on superior and medium-superior levels in the security of the technologies of telecommunications/ICT.
29. Increase the training in network security for the network administrators and designers of computer applications.

Specific actions for the medium- and long-term (2017-2020):

1. Continue the penetration of fixed-line telephone services, beginning the deployment of voice technologies over the data networks.

2. Introduce packets of service for voice + Internet + TV + video on demand, with bandwidths of 50 mb/s and 150 mb/s for the simultaneous reception of several TV channels, with TV broadcasting services and high-definition video on demand.
3. Achieve the deployment of solutions combined of fiber optic technologies and copper wire.
4. Increase the security of the solutions of passive fiber optics through configurations of the loop.
5. Incorporate the points of WiFi access as a complement of the cellular network, which relieves the cellular networks from accelerated growth in traffic.
6. Implement solutions with small cells to improve the coverage of the mobile network, in interior as well as exterior areas where there isn't coverage or there is congestion of the macro cells, which will relieve the traffic on the cellular network.
7. Assure in the architecture of the telecommunications network in Cuba the levels of redundancy required in the Principal Network and in the remaining elements of the network (data centers, control platforms, etc.) for a decrease in vulnerability.
8. Continue to enhance studies in telecommunications and computer technologies, and the security of telecommunications/ICT technologies.
9. Increase the number of classes for network administrators, computer application design and training and certification in network security.
10. Strengthen the structures of the entities responsible for the control of security of telecommunications/ICT.