

A Compliance Guide for Satellite Network Operators Who Plan to Conduct Business in China

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Abstract

In 2020, SpaceX, OneWeb, and other companies lead the construction of the space-based internet constellation. Although it may take time for these constellations to enter extensive commerce, for space-based internet constellation operators (hereinafter Operators), obtaining an operating license is as important as achieving technical goals. As the laws and regulations on telecommunication qualification authorization, radio equipment type approval (hereinafter TA), and cross-border data protection, and Operators need to conduct compliance reviews before conduct business in accordance with the characteristics of their space-based internet access products. Factors such as a vast land area, huge population, and complex terrain are expected to create a huge satellite Network market in China.

This paper will analyze and classify the satellite Network products related to China's laws and regulations currently in force. This paper focuses on Regulations of the People's Republic of China on the Management of Radio Operation, Administrative Provisions on the Establishment of Space radiocommunication Networks as well as the Setup and Use of Earth Stations, Telecommunication Regulation of the People's Republic of China, and other related regulations, etc. This paper will give a brief compliance guide for satellite network operators who plan to conduct business in China by analyzing business models and laws. Finally, this paper will analyze the legislative trends of laws and regulations related to the satellite network and policy trends and the changes and opportunities that may be brought to satellite network compliance.

Keywords: space-based internet access, licensing system, market access

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1. Introduction

2015 could be deemed “the First Year of Commercial Aerospace of China” by most space-based internet constellation operators. The National Development and Reform Commission, Ministry of Finance of the People’s Republic of China, and China National Space Administration published the *National Civil Space Infrastructure Medium-term and Long-term Development Plan (2015-2025)* in 2015 and identified the non-government investment entity might conduct commercial space activities.¹

However, there are still obstacles in China’s aerospace activities’ regulatory system, which make Operators confused. According to Article 6 of *The Setup of Satellite’s Space Stations Regulation of China*,² only government investment entities can apply to the radio regulatory authority for the Space Station License. In contrast, private enterprises cannot apply for the Space Station License. Therefore, since holding the Space Station License is necessary for applying for the Launch License, private enterprises cannot apply for the Launch License.

The inspiring changes occurred in 2016; the revised *Radio Regulation of the People’s Republic of China*,³ as the legal basis of the Space Station License application, have been issued in November 2016. The revised Radio Regulation of China no longer limits the Space Station License applicant to a government investment entity. In recent years, many private enterprises have been applying for the Space Station Licenses and have launched satellites successfully.

Since 2015, China’s private enterprises have launched several experimental radiocommunications satellites or announced operation plans. However, there is no new entity that gets a license to carry out space radiocommunications services.

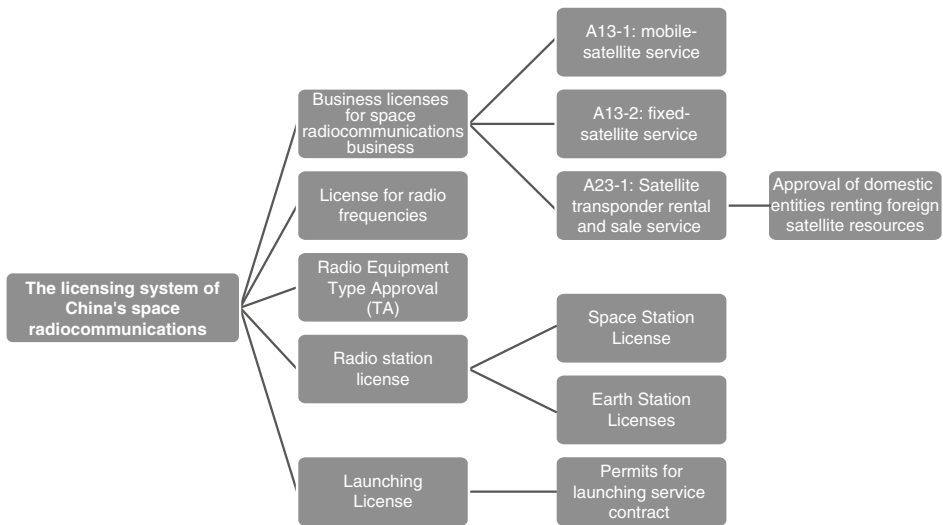
In 2019, iResearch, a local aerospace industry research institution, issued a “*Research Report on the Development of China’s Commercial Aerospace Industry*” to point out that compliance risks hold back China’s development’s space radiocommunications industry. Space radiocommunication in this paper refers to space-based internet access service based on huge LEO constellation.

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- 1 National Civil Space Infrastructure Medium-term and Long-term Development Plan (2015-2025), https://www.ndrc.gov.cn/xxgk/zcfb/ghwb/201510/t20151029_962171.html, (accessed 30.09.20).
 - 2 The Setup of Satellite’s Space Stations Regulation of China. 23 September 1999, <http://www.miit.gov.cn/n1146295/n1146592/n3917132/n4062354/n4062378/n4062382/n4062385/c4165302/content.html>, (accessed 30.09.20).
 - 3 Radio Regulation of the People’s Republic of China (2016). 11 November 2016, http://www.gov.cn/zhengce/content/2016-11/25/content_5137687.htm, (accessed 30.09.20).

2. The licensing system space radiocommunications of China’s

For Operators, the Telecommunications Business License from the Ministry of Industry and Information Technology of China (hereinafter MIIT) and or the telecommunications administrative authorities of the provinces, autonomous regions, and cities under the direct control of the Central Government (hereinafter the Telecommunications Business License) is a prerequisite for business development. Besides, depending on the different service modes of telecommunication business, other licenses may be required.

Fig. 1. The licensing system of China’s space radiocommunications



2.1. Business licenses for space radiocommunications business

- The *Telecommunication Regulation of China (2015)* regulates China’s Telecommunications licensing system. According to Article 7 and Article 8 of the *Telecommunication Regulation of China (2015)*,⁴ the telecommunications business shall be conducted with a Telecommunications Business License. The telecommunications business is divided into two categories: Basic Telecommunications Business and Value-added Telecommunications Business.
- The Basic Telecommunications Business refers to the provision of basic facilities of public networks, public data transmission, and basic speech communication.

4 Telecommunication Regulation of China (2016). 2 February 2006, http://www.gov.cn/gongbao/content/2016/content_5139478.htm (accessed 30.09.20).

- Value-added Telecommunications Business refers to the provision of telecommunication and information services by using the basic facilities of public networks.

2.1.1. The Telecommunications Service Classification Code

As the appendix of the *Telecommunication Regulation of China (2015)*, the *Catalogue of Telecommunications Business of China* lists the telecommunications business's detailed categories. MIIT may update and renew this Catalogue under the real situation. The lasted Catalogue was updated in 2019,⁵ which set "A12-4 Fifth Generation Digital Cellular Mobile Communication Service" as a sub-category service that belongs to "A12 Cellular Mobile Communication Service".

The telecommunications service classification code consists of 4 parts:

- The first code is used to identify whether the service is a basic telecommunications service or value-added telecommunications service. A refers to basic telecommunications service, and B refers to value-added telecommunications service;
- The second code is used to identify whether the service is the first-catalog of telecommunications service or the second-catalog. 1 refers to the first-catalog of telecommunications service, 2 refers to the second-catalog of telecommunications service;
- The third code is the telecommunications service classification code, which refers to different telecommunications services;
- The fourth code is the sub-code of the telecommunication service classification, which refers to the subdivided telecommunication service.

Taking "A12-4 Fifth Generation Digital Cellular Mobile Communication Service" as an example:

- The first code, "A" refers to basic telecommunications service;
- The second digit code "1" refers to the first-catalog of telecommunications service;
- The third code, "2" refers to digital cellular mobile communication service;
- The fourth code, "4" refers to fifth-generation digital cellular mobile communication service.

Therefore, "A12-4" clearly shows that the Fifth Generation Digital Cellular Mobile Communication Service is a sub-category service of the cellular digital

5 Announcement of the Ministry of Industry and Information Technology on the revision of the "Catalogue of Telecommunications Business of China (2015)", 6 June 2019, http://www.gov.cn/xinwen/2019-06/06/content_5397930.htm (accessed 30.09.20).

communication service, which belongs to first-catalog basic telecommunication service.

2.1.2. Space Radiocommunications Services in China

According to the *Catalogue of Telecommunications Business (2019)*,⁶ four kinds of space radiocommunications services belong to 4 sub-catalogs; the telecommunications service classification codes are A13-1, A13-2, A23-1, and A23-2.

The A13 (first-category space radiocommunications service) including:

- A13-1: mobile-satellite service (hereinafter MSS)
- A13-2: fixed-satellite service (hereinafter FIXED-SATELLITE SERVICE)

The A23 (second-category space radiocommunications service) including:

- A23-1: Satellite transponder rental and sale service
- A23-2: VSAT service

2.1.3. A13-1 Mobile-Satellite Service

The *Catalogue of Telecommunications Business (2019)* defined A13-1 mobile-satellite service as:

Mobile-satellite service means the Operator can provide voice, data, and multimedia communications services on land, sea, and air to users of mobile earth stations, or mobile handheld terminals, portable terminals, vehicle (ships, airplanes)-borne terminals, through mobile-satellite service systems composed of communication satellites, earth stations, and system control centres. Mobile-satellite service operators should establish mobile-satellite service network facilities, and they can provide complete or partial services. When providing cross-border mobile-satellite service, it shall be transferred through the international communication gateway established by China. The mobile-satellite service network can be the same Operator or the networks of different operators.

2.1.4. A13-2 Fixed-Satellite Service

The *Catalogue of Telecommunications Business (2019)* defined fixed-satellite service as:

Fixed-satellite service means operators can provide voice, data, and multimedia communications services on land, sea, and air to users of fixed station (including transportable station) through fixed-satellite service systems composed of communication satellites, earth stations, and system control centers. The operators of fixed-satellite services should establish fixed-satellite service network facilities and provide complete or partial

⁶ *Catalogue of Telecommunications Business of China (2015)*, 28 December 2015, <http://www.miit.gov.cn/n1146295/n1652858/n1652930/n4509627/c4564595/content.html> (accessed 30.09.20).

services. When providing cross-border fixed-satellite service, it shall be transferred through the international communication gateway established by China. The fixed-satellite service network can be the network of the same Operator or the networks of different operators.

In addition, the Catalogue of Telecommunications Business (2019) defines explicitly Satellite-Based International Private Line Service belonging to fixed-satellite services as follow:

Satellite-based international private line service belonging to the fixed-satellite service and including the point-to-point international transmission channel service and private line rental service through a fixed-satellite service system composed of fixed satellite earth stations, and GSO satellites (or non-GSO satellites). The satellite-based international private line service includes permanent connection service and semi-permanent connection service. The earth stations that provides satellite-based international private line service are located in China and foreign and can be rented or purchased by end-users. satellite-based international private line service Operators should establish space radiocommunication network facilities.”

The definitions of A13-1 and A13-2 are based on the definitions of mobile-satellite service and fixed-satellite service in *ITU Radio Regulation (2016)* and supplied different service modes' requirements.

2.1.5. A23-1 Satellite Transponder Rental and Sale Service

The *Catalogue of Telecommunications Business (2019)* defined A23-1 Satellite transponder rental and sale service as:

Satellite transponder rental and sale service refer to renting or sailing self-owned or leased satellite transponder resources (including one or more complete transponders, partial transponder bandwidth, and capacity, etc.) to users under the needs of users. Users could use leased or purchased satellite transponder resources to provide services for themselves or other commercial or individual users. Satellite transponder rental and sale service operators can use their own or leased satellite transponder resources to carry out corresponding rental or sale business activities within the territory of China.

2.1.6. A23-2 VSAT Satellite Transponder Rental and Sale Service

The Catalogue of Telecommunications Business (2019) defined A23-2 VSAT service as:

The domestic very small-aperture terminal earth station (VSAT) communication service means the Operator can provide voice, data, and multimedia communications services between the central station and the VSAT earth station, which under the management and control of the central station of the VSAT communication system. The earth station is composed of very small aperture antennas, and satellite transmitting and receiving equipment is called VSAT earth station. The VSAT system is composed of satellite transponders, central stations, and VSAT earth stations. Domestic

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VSAT Operators should establish a VSAT system to provide voice, data, and multimedia communication services between the central station and VSAT earth stations, or communication services between VSAT earth stations.

The A23-1 Satellite transponder rental and sale service and A23-2 VSAT service are defined under special service mode. A23-1 operators can be considered a supplier of A13-1 Operator or A13-2 Operator (providing space radiocommunication resources). A23-2 is a unique satellite fixed service. It might also be noted that A23-2 VSAT service is managed regarding the value-added telecommunications business license.

2.1.7. **The Differences Between A13-1, A13-2, and A23-1 Operators**

For Operators, all Space-based internet Access Services shall be conducted with an A13-1, A13-2, or A23-1 license obtained from MIIT. The differences between these three kinds of Operators are as follows:

Table 1. The differences between A13-1, A13-2, and A23-1 Operators

| | A13-1 Operator | A13-2 Operator | A23-1 Operator |
|--------------|--|---|---|
| Clients | A13-1 operators can offer mobile-satellite service directly to customers. | A13-2 operators can offer fixed-satellite service directly to customers. | A23-1 operators can offer satellite transponder resources to A13-1 operators or A13-2 operators. |
| Service Mode | A13-1 operators can use their satellite networks to provide mobile-satellite service or use other operators' satellite networks. | A13-2 operators can use their satellite networks to provide fixed-satellite service or use other operators' satellite networks. | A23-1 operators can use their satellite networks to provide transponder rental and sale service or use other operators' satellite networks. |
| Service area | A13-2 operators can provide international MOBILE-SATELLITE SERVICE. | A13-2 operators can provide satellite-based international private line service. | The service area of the A23-1 Operator is restricted to China's territory. |

2.2. **Approval of Domestic Entities Renting Foreign Satellite Resources**

According to *Notice on Further Regulating the Space radiocommunication Service Market*,⁷ the A23-1 Operator shall obtain domestic entities' approval to rent foreign satellite resources before providing foreign satellite resources for clients.

7 Catalogue of Telecommunications Business of China (2015), 28 December 2015, <http://www.miit.gov.cn/n1146295/n1652858/n1652930/n4509627/c4564595/content.html> (accessed 30.09.20).

2.3. License for Radio Frequencies

According to its service model, space-based internet access operators also need to establish or lease a space radiocommunications system. Before technologies such as laser communication and quantum communication are put into practical use, the use and operation of space radiocommunication systems must use radio frequencies. Once an operator decides to start a business in China, it must obtain a License for radio frequencies.

As mentioned in Chapter 1, China's radio regulatory system is based on *Radio Regulation of the People's Republic of China (2016)*. According to Article 14 of this Regulation, in principle, a license shall be obtained for radio frequencies, unless use following radio frequencies:

- Frequencies of amateur radio stations, public speakerphone, and compulsory radio stations;
- International fixed frequencies of Global Distress and Security Systems for aviation, maritime, and radio navigation services;
- Frequencies used by Short Range Device (SRD).

Article 22 sets out the general principles for using satellite radio frequencies; MIIT shall uniformly allocate to users the satellite radio frequencies allocated by the International Telecommunication Union (ITU) to China for use according to international rules and planning. Applications for the use of satellite radio frequencies not covered by the ITU planning shall be uniformly filed through the state's radio regulatory authority. The radio regulatory authority of the state shall, on time, organize relevant entities to conduct necessary domestic coordination, and conduct international declaration, coordination, and registration according to international rules.

Article 23 sets out the principles for the using satellite radio frequencies to building a space radiocommunication network, where any satellite radio frequency needs to be used for the building of a space radiocommunication network, information as space radio stations, satellite orbit location, and satellite coverage scope to be used, as well as the certification materials on the completion of domestic coordination and necessary international coordination, among others, shall also be provided.

Article 24 sets out principles for using foreign satellite radio frequencies to set up a space radiocommunication network. To conduct business with the satellite radio frequency of any other country or region, the applicant shall comply with China's provisions on satellite radio frequencies administration and complete the coordination with satellite radio frequencies applied by China.

2.4. Radio Equipment Type Approval (TA)

According to Article 44 of *Radio Regulation of the People's Republic of China (2016)*, a TA is necessary to produce or import radio transmission equipment for domestic sales and use, unless the radio transmission

equipment is an SRD. Since there is no SRD equipment and ISM frequency available for space radiocommunications,⁸ the earth station and terminal equipment used in space radiocommunication need TA.

2.5. Radio Station License

Suppose the Operator decides to manufacture and launch communications satellites owned by China or a China's individual or entity, and those communications satellites need radio frequencies to provide service. In that case, it shall apply Space station licenses for its satellites.

According to the Article 27 of *Radio Regulation of the People's Republic of China (2016)*, to set up or use a radio station, the applicant shall apply to MIIT for the radio station license, except ground public mobile communication terminals, radio stations that only receive a radio signal, or SRD. Article 30 stipulates that applicants should apply to MIIT for a space station license.

Also, Earth station radio licenses are also necessary for operators who need earth stations located in China for TT&C.

2.6. Launching License

According to Article 1 of *Interim Measures on the Administration of Permits for Civil Space Launch Projects*,⁹ when the Operator decides to launch communications satellites in China, whether China or other countries own the satellites, it shall apply for a Launch License before launching its satellites. If the Operator decides to launch foreign communications satellites in China, it shall obtain a permit for launching service contract Article 9 of this regulation.

3. Compliance Guideline for Satellite Operators

According to different service modes of space radiocommunication services, a brief space radiocommunication compliance guideline could be combined with the licenses listed in Chapter 2. This Chapter will provide compliance guidelines under several typical service modes and point out the barriers to entry.

3.1. Compliance Guideline for A13-1 Operators

For A13-1 operators, the necessary operating licenses include an A13-1 license, License for the use of radio frequencies, and TA of service terminal. Service provided by domestic satellites or foreign satellites; Using domestic

⁸ M2M/IoT Operation via Satellite, ECC Report 305, 14 February 2020.

⁹ Interim Measures on the Administration of Permits for Civil Space Launch Projects, 21 December 2002, http://www.gov.cn/gongbao/content/2003/content_62252.htm (accessed 30.09.20).

satellite network data or foreign satellite network data to set up domestic satellites while providing MOBILE-SATELLITE SERVICE by domestic satellites, and whether to launch satellites in China or not will result in different license requirements. See the table below for details.

Table 2. Compliance guideline for A13-1 Operators

| Service Mode | Necessary Operating Licenses | Legal Basis for License for the use of radio frequencies | Radio station license | Launching License |
|---|---|--|--|---|
| Provide MOBILE-SATELLITE SERVICE with domestic satellites set up by a domestic satellite network data | A13-1 license License for the use of radio frequencies TA | Article 23 of Regulation of the People’s Republic of China | Space station license is necessary | If launching satellites in China, Launching License is necessary |
| | | | If TT&C at China, Earth station radio license is necessary | |
| Provide MOBILE-SATELLITE SERVICE with domestic satellites set up by a foreign satellite network data | | Article 24 of Regulation of the People’s Republic of China | Space station license is necessary | If launching satellites in China, Launching License is necessary |
| | | | If TT&C at China, Earth station radio license is necessary | |
| Provide MOBILE-SATELLITE SERVICE with foreign satellites | | Article 24 of Regulation of the People’s Republic of China | If TT&C at China, Earth station radio license is necessary | If launching satellites in China, Launching License with a permit for launching service contract is necessary |

3.2. Compliance Guideline for A13-2 Operators

For A13-2 operators, the necessary operating licenses include an A13-2 license, License for the use of radio frequencies, and TA for earth station equipment. Service provided by domestic or foreign satellites; Using domestic or foreign satellite network data to set up domestic satellites while providing FIXED-SATELLITE SERVICE by domestic satellites, and whether to launch

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satellites in China or not will result in different license requirements. See the table below for details.

Table 3. Compliance guideline for A13-2 Operators

| Service Mode | Necessary Operating Licenses | Legal Basis for License for the use of radio frequencies | Radio station license | Launching License |
|---|---|--|--|---|
| Provide FIXED-SATELLITE SERVICE with Domestic satellites setup by a domestic satellite network data | A13-2 license License for the use of radio frequencies TA | Article 23 of Regulation of the People’s Republic of China | Space station license is necessary | If launching satellites in China, Launching License is necessary |
| If TT&C at China, Earth station radio license is necessary | | | | |
| Provide FIXED-SATELLITE SERVICE with Domestic satellites setup by a foreign satellite network data | | Article 24 of Regulation of the People’s Republic of China | Space station license is necessary | If launching satellites in China, Launching License is necessary |
| If TT&C at China, Earth station radio license is necessary | | | | |
| Provide FIXED-SATELLITE SERVICE with foreign satellites | | Article 24 of Regulation of the People’s Republic of China | If TT&C at China, Earth station radio license is necessary | If launching satellites in China, Launching License with permit for launching service contract is necessary |

3.3. Compliance Guideline for A23-1 Operators

For A23-1 operators, the necessary operating licenses include A23-1 license, License for the use of radio frequencies. Service provided by domestic satellites or foreign satellites; Using domestic satellite network data or foreign satellite network data to set up domestic satellites while providing Satellite transponder rental and sale service by domestic satellites, and whether to launch satellites in China or not or not will result in different license requirements. See the table below for details.

Table 4. Compliance guideline for A13-2 Operators

| Service Mode | Necessary Operating Licenses | Legal Basis for License for the use of radio frequencies | Radio station license | Launching License |
|---|---|---|--|---|
| Provide Satellite transponder rental and sale service with Domestic satellites setup by a domestic satellite network data | A23-1 license License for the use of radio frequencies | Article 23 of Regulation of the People’s Republic of China | Space station license is necessary If TT&C at China, Earth station radio license is necessary | If launching satellites in China, Launching License is necessary |
| Provide Satellite transponder rental and sale service with Domestic satellites setup by a foreign satellite network data | | Article 24 of Regulation of the People’s Republic of China | Space station license is necessary If TT&C at China, Earth station radio license is necessary | |
| Provide Satellite transponder rental and sale service with foreign satellites | | Article 24 of Regulation of the People’s Republic of China Approval of domestic entities renting foreign satellite resources | If TT&C at China, Earth station radio license is necessary | If launching satellites in China, Launching License with a permit for launching service contract is necessary |

3.4. The Requirement for applying A13-1, A13-2, and A23-1 Licenses.

According to Article 10 of the *Telecommunication Regulation of China (2015)* and Article 5 of the *Measures for the Administration of Telecommunications Business Licensing*, the requirements for applying A13-1, A13-2, and A23-1 Licenses including:

- A State-owned or State-controlled company.
- The registered capital is at least CNY 1 billion.

- Prepared Feasibility Study Report and Plan for the structuring of networks.
- Enough money and professionals for operating.
- Having a fixed place and the related resources for the business.
- Having the credibility and capacity to provide long-term services.

Therefore, Private enterprises cannot get a Radiocommunication License, unless it cooperates with a state-owned company to establish a state-controlled company to carry out space radiocommunication service.

4. Conclusions

For a long time, China's space radiocommunications' management mode is different from that of the European Union. MIIT authorizes operators to use resources (License for radio frequencies and Radio station license) and operate the business (Business licenses for space radiocommunications business) independently.¹⁰

China does not have a space radiocommunications operator with mature technology and sufficient scale to maintain space radiocommunications operations like Starlink. Therefore, the MIIT now authorizes operators to use frequency licenses to experiment with technology and develop technologies and products. As satellite frequency resources are extremely limited,¹¹ it is foreseeable that the Chinese government will allocate space radiocommunication frequencies through administrative orders and other measures to achieve the optimal allocation of resources. Therefore, operators who actively participate in technology trials and test different service modes, might gain more government favour during radio frequency resource allocation.

Since 2018, start-up aerospace entities of China have launched more than ten experimental radiocommunication satellites. Most of the entities claim that they have tested space radiocommunication with ground IoT terminals. And they are planning to operate a narrowband radiocommunication or space based IoT constellation. Since narrowband radiocommunication service and space based IoT service does not require so many frequency resources. MIIT may also set up an operation license for this mode of service. Besides, if IoT terminals of space based IoT service could accord with the standard of SRD, it will greatly reduce the compliance obligations of operators.

10 Zhengchun GUO, Study on Telecommunication Marketing Accessing System, 2007, Hunan University, MA thesis.

11 PAN Ji, LIU Shanshan, HAN Ru, Feasibility Study on Satellite Frequency Resource for Space-Terrestrial Integrated Information Network, *Radiocommunications Technology*, 46.05(2020):546-552.

