Government of Canada / Gouvernement du Canada

RIC-3 — Information on the Amateur Radio Service

Issue 5

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Preface

Radiocommunication Information Circulars (RICs) are issued for the guidance of those engaged in radiocommunications in Canada. The information contained in these circulars is subject to change without notice. Interested persons should therefore consult the nearest Innovation, Science and Economic Development Canada (ISED) District Office for additional details. While every reasonable effort has been made to ensure the information is accurate, no warranty is expressed or implied. It is important to note that these circulars have no status in law.

This RIC has been updated to reflect the changes made to the *Radiocommunication Regulations*, specifically the rescinded ISED examination fee for Amateur Radio Operator Certificates and the removal of certificates that are no longer issued by ISED. Other revisions includes editorial corrections for clarity.

Comments and suggestions may be directed to the following address:

Innovation, Science and Economic Development Canada
Spectrum Management Operations Branch
235 Queen Street Ottawa ON K1A 0H5

Attention: Radio Licensing Policy

Email: spectrumoperations-operationsduspectre@ised-isde.gc.ca

All ISED publications related to spectrum management and telecommunications are available on the Spectrum Management and Telecommunications website.

1. Introduction

The *Radiocommunication Regulations* describe the "amateur radio service" as "a radiocommunication service in which radio apparatus are used for the purpose of self-training, intercommunication or technical investigation by individuals who are interested in radio technique solely with a personal aim and without pecuniary interest."

Innovation, Science and Economic Development Canada (ISED) believes that amateur radio should be readily accessible to Canadians. As such, those who are interested in the science and art of radiocommunication may avail themselves of every reasonable opportunity to learn about, enjoy, contribute to or participate in this service. The requirement for operators to have some technical and operating knowledge before being granted access to amateur radio bands is a well-established and internationally recognized principle.

To learn more about amateur radio in Canada, contact local amateur radio clubs or one of the following organizations:

Radio Amateurs of/du Canada
Suite 217, 720 Belfast Road
Ottawa ON K1G 0Z5

Telephone: 613-244-4367
Fax: 613-244-4369
Email: rachq@rac.ca

Radio Amateur du Québec Inc.
4545 Pierre-de-Coubertin Avenue

Montréal QC H1V 0B2

Telephone: 514-252-3012
Fax: 514-254-9971
Email: admin@raqi.ca

ISED's Amateur Radio Service Centre is responsible nationally for all amateur certification, call signs and examiner accreditation. The processing centre should be the first point of contact for all matters pertaining to amateur radio. Correspondence and enquiries should be directed to the following address:

Innovation, Science and Economic Development Canada
Amateur Radio Service Centre
2 Queen Street East
Sault Ste. Marie ON P6A 1Y3

Telephone: 1-888-780-3333 (toll-free)
Fax: 705-941-4607
Email: spectrumamateur-spectreamateur@ised-isde.gc.ca

2. Purpose

This circular describes, in general terms, procedures, policies and general information concerning the amateur radio service. It also includes syllabuses for Amateur Radio Operator Certificate qualification examinations.

3. Related documents

The following publications pertain to amateur radio:

RIC-1
Guide for Examiners Accredited to Conduct Examinations for Amateur Radio Operator Certificates

RIC-9
Call Sign Policy and Special Event Prefixes

RBR-4
Standards for the Operation of Radio Stations in the Amateur Radio Service

Acronyms
RBR – Regulation by Reference
RIC – Radiocommunication Information Circular

4. Qualifications

This section describes certification in the amateur radio service, equivalent certificates, equivalent operating privileges, general criteria for operation in high frequency (HF) bands, and the privileges and restrictions specific to each of the qualifications associated with Amateur Radio Operator Certificates.

4.1 Certification

Authority to operate radio apparatus in the amateur radio service is issued to holders of an Amateur Radio Operator Certificate with Basic Qualification.

Other qualifications available with the Amateur Radio Operator Certificate are Morse Code and Advanced Qualification.

Operating privileges are granted according to the level of achievement. Attaining honours scores (i.e. 80% or above) on the basic examination, or attaining qualifications in addition to the Amateur Radio Operator Certificate with Basic Qualification will grant the certificate holder additional operating privileges as specified in Regulation by Reference RBR-4, *Standards for the Operation of Radio Stations in the Amateur Radio Service*, including full access to the amateur frequency bands below 30 MHz (i.e. HF).

4.2 Equivalent certificates

The holder of an Amateur Radio Operator's Certificate or an Amateur Radio Operator's Advanced Certificate issued under the repealed *Radio Operator's Certificate Regulations* has the same operating privileges as the holder of an Amateur Radio Operator Certificate with Basic, Basic with Honours and Advanced qualifications.

The holder of an Amateur Digital Radio Operator's Certificate issued under the repealed *Radio Operator's Certificate Regulations* has the same operating privileges as the holder of an Amateur Radio Operator Certificate with Basic and Advanced qualifications.

For a complete list of certificate equivalencies for certificates issued under the repealed *Radio Operator's Certificate Regulation*s, refer to Schedule I in the *Radiocommunication Regulations*.

4.3 Equivalent operating privileges

Persons holding any of the following Canadian certificates may be issued an authorization to operate in the amateur radio service with the same operating privileges as the holder of an Amateur Radio

Operator Certificate with Basic Qualification:

- Radiotelephone Operator's General Certificate (Aeronautical)
- Radiotelephone Operator's General Certificate (Maritime)
- Radiotelephone Operator's General Certificate (Land)

Persons holding an Amateur Radio Operator Certificate with Basic Qualification issued prior to April 1, 2002, will be granted the same operating privileges as the holder of an Amateur Radio Operator Certificate with Basic Qualification with Honours.

Persons holding an Amateur Radio Operator Certificate with Basic Qualification issued on or after April 1, 2002, will be granted the same operating privileges as the holder of an Amateur Radio Operator Certificate with Basic Qualification with Honours if they can demonstrate that they have attained a mark of 80% or above on their basic examination.

4.4 General criteria for operation in HF bands

Privileges granted to amateurs with an existing authorization will be based on the following criteria:

a. Amateurs holding both basic and advanced qualifications will be allowed to operate in the HF bands below 30 MHz.

b. Amateurs certified prior to April 2, 2002, will be allowed to operate in the HF bands below 30 MHz based on the experience and knowledge they will have acquired over this period of time.

c. Amateurs certified after April 1, 2002, who have demonstrated a superior knowledge of operational, technical and regulatory requirements by achieving a mark of 80% or above on the basic

examination will be allowed to operate in the HF bands below 30 MHz.

4.5 Privileges and restrictions

Privileges and restrictions can be found in the *Radiocommunication Regulations* and in RBR-4. A brief summary follows.

4.5.1 Basic Qualification

The following privileges and restrictions are applicable to the Basic Qualification:

- access to all amateur bands above 30 MHz
- use a maximum of 250 watts DC transmitter input power
- build and operate all station equipment, except for "home-made" transmitters ("build" in the context of the Amateur Radio Operator Certificate with Basic Qualification is limited to the assembly of commercially available transmitter kits of professional design)
- re-programming of radio equipment to operate in the amateur bands if this can be done by a computer program (note that no physical modifications to the circuitry of the radio are permitted)
- operation of cross-band repeaters
- operation through a repeater established by an amateur with the Advanced Qualification
- no remote control of fixed stations permitted regardless of medium used for control ("remote control" is the ability to indirectly manipulate the technical parameters (i.e. bandwidth,

emission type, output power, etc.) of a radio by means of some intermediate medium; operation through a repeater is not considered to be remote control)

In addition to the above-mentioned privileges and restrictions, the Basic Qualification with Honours (i.e. a score of 80% or above) also allows access to all amateur bands below 30 MHz.

4.5.2 Advanced Qualification

The following privileges and restrictions are applicable to the Advanced Qualification:

- access to all amateur bands below 30 MHz
- use a maximum transmitter power of 1000 watts DC input
- build and operate transmitting equipment
- modify radio apparatus by computer program or physical modifications to the circuitry
- establishment of repeaters and club stations
- remote control of fixed stations, including the use of radio links

4.5.3 Morse Code (with either Basic Qualification or both Basic Qualification and Advanced Qualification)

The following privilege is applicable to Morse Code (with either Basic Qualification or both Basic Qualification and Advanced Qualification):

- access to all amateur bands

4.5.4 Non-qualified persons

Non-qualified persons may use an amateur radio station, provided a qualified operator is present to perform the control functions.

5. Examinations

This section provides an outline of the examinations for Basic, Advanced and Morse Code qualifications. It also describes the examination procedures and explains the re-examination process.

5.1 Basic Qualification Examination

An examination of 100 questions is prepared by drawing one question from a series of questions applicable to the following 100 topic areas. The pass mark is 70%. A score of 80% or above will grant the individual additional privileges commensurate with the Basic Qualification with Honours.

5.1.1 Regulations and Policies - 001

1-1	radio licences, applicability, eligibility of licence holder
1-2	licence fee, term, posting requirements, change of address
1-3	licence suspension or revocation, powers of radio inspectors, offences and punishments
1-4	operator certificates, applicability, eligibility, equivalents, reciprocal recognition
1-5	operation, repair and maintenance of radio apparatus on behalf of other persons
1-6	operation of radio apparatus, terms of licence, applicable standards, exempt apparatus

1-7	content restrictions - non-superfluous, profanity, secret code, music, non-commercial
1-8	installation and operating restrictions - number of stations, repeaters, home-built, club stations
1-9	participation in communications by visitors, use of station by others
1-10	interference, determination, protection from interference
1-11	emergency communications (real or simulated), communication with non-amateur stations
1-12	non-remuneration, privacy of communications
1-13	station identification, call signs, prefixes
1-14	foreign amateur operation in Canada, banned countries, third-party messages
1-15	frequency bands and qualification requirements
1-16	maximum bandwidth by frequency bands
1-17	restrictions on capacity and power output by qualifications
1-18	unmodulated carriers, retransmission
1-19	amplitude modulation, frequency stability, measurements
1-20	International Telecommunication Union (ITU) *Radio Regulations*, applicability
1-21	operation outside Canada, ITU regions, reciprocal privileges, international licences

1-22	examinations - delegated examinations, disabled accommodation
1-23	antenna structure approval, neighbour and land-use authority consultation
1-24	radio frequency electromagnetic field limits
1-25	criteria for resolution of radio frequency interference complaints

5.1.2 Operating and Procedures - 002

2-1	voice operating procedures - channelized VHF/UHF repeater
2-2	phonetic alphabet
2-3	voice operating procedures - simplex VHF/UHF and HF
2-4	tuneups and testing, use of dummy load, courteous operation
2-5	Morse (CW) operating procedures, procedural signs
2-6	RST system of signal reporting, use of S meter
2-7	Q signals
2-8	emergency operating procedures
2-9	record keeping, confirmation practices, maps/charts, antenna orientation

5.1.3 Station Assembly, Practice and Safety - 003

3-1	functional layout of HF stations
3-2	functional layout of FM transmitters
3-3	functional layout of FM receivers
3-4	functional layout of CW transmitters
3-5	functional layout of SSB/CW receivers
3-6	functional layout of SSB transmitters
3-7	functional layout of digital systems
3-8	functional layout of regulated power supplies
3-9	functional layout of Yagi-Uda antennas
3-10	receiver fundamentals
3-11	transmitter, carrier, keying, and amplitude modulation fundamentals
3-12	carrier suppression, SSB fundamentals
3-13	frequency and phase modulation fundamentals
3-14	station accessories for telegraphy, radiotelephony, digital modes
3-15	digital mode fundamentals RTTY, ASCII, AMTOR, packet
3-16	cells and batteries, types, ratings, charging
3-17	power supply fundamentals
3-18	electrical hazards, electrical safety, security
3-19	electrical safety ground, capacitor discharge, fuse replacement

3-20	antenna and tower safety, lightning protection
3-21	exposure of human body to RF, safety precautions

5.1.4 Circuit Components - 004

4-1	amplifier fundamentals
4-2	diode fundamentals
4-3	bipolar transistor fundamentals
4-4	field-effect transistor fundamentals
4-5	triode vacuum tube fundamentals
4-6	resistor colour codes, tolerances, temperature coefficient

5.1.5 Basic Electronics and Theory - 005

5-1	metric prefixes - pico, micro, milli, centi, kilo, mega, giga
5-2	concepts of current, voltage, conductor, insulator, resistance
5-3	concepts of energy and power, open and short circuits
5-4	Ohm’s law - single resistors
5-5	series and parallel resistors
5-6	power law, resistor power dissipation
5-7	AC, sinewave, frequency, frequency units
5-8	ratios, logarithms, decibels

5-9	introduction to inductance, capacitance
5-10	introduction to reactance, impedance
5-11	introduction to magnetics, transformers
5-12	introduction to resonance, tuned circuits
5-13	introduction to meters and measurements

5.1.6 Feedlines and Antenna Systems - 006

6-1	feed line characteristics, characteristic impedance
6-2	balanced and unbalanced feed lines, baluns
6-3	popular antenna feed line and coaxial connector types
6-4	line losses by line type, length and frequency
6-5	standing waves, standing wave ratio (SWR) meter
6-6	concept of impedance matching
6-7	isotropic source, polarization via element orientation
6-8	wavelength vs physical length
6-9	gain, directivity, radiation pattern, antenna bandwidth
6-10	vertical antennas - types, dimensions, characteristics
6-11	Yagi antennas - types, dimensions, characteristics
6-12	wire antennas - types, dimensions, characteristics
6-13	quad/loop antennas - types, dimensions, characteristics

5.1.7 Radio Wave Propagation - 007

7-1	line of sight, ground wave, ionospheric wave (sky wave)
7-2	ionosphere, ionospheric regions (layers)
7-3	propagation hops, skip zone, skip distance
7-4	ionospheric absorption, causes and variation, fading, phase shift, Faraday rotation
7-5	solar activity, sunspots, sunspot cycle
7-6	MF and HF, critical and maximum useable frequencies, solar flux
7-7	VHF and UHF, sporadic-E, aurora, ducting
7-8	scatter - HF, VHF, UHF

5.1.8 Interference and Suppression - 008

8-1	front-end overload, cross-modulation
8-2	audio rectification, bypass capacitors, ferrites
8-3	intermodulation, spurious, key-clicks
8-4	harmonics, splatter, transmitter adjustments
8-5	use of filters: low-pass, high-pass, band-pass, band-reject

5.2 Morse Code Qualification Examination

The examination for this qualification consists of sending and receiving Morse Code at a speed of not less than 5 words per minute

(w.p.m.) for three consecutive minutes.

The Morse Code examination is in plain language and may include the 26 letters, the 10 numbers, comma, period, question mark, dash, fraction bar, Q-signals and emergency signals. In both the sending and receiving examinations, each character omitted or incorrectly sent or received is counted as one error. A mark of 100% is awarded for five errors or less, 99% for six errors, 98% for seven errors, 97% for eight errors, etc. The examiner will allow candidates two minutes to review and correct their copy before it is graded. The pass mark is 100%.

5.3 Advanced Qualification Examination

An examination of 50 questions is prepared by drawing one question from a series of questions applicable to the following 50 topic areas. The pass mark is 70%.

5.3.1 Advanced Theory - 001

1-1	time constant - capacitive and inductive
1-2	electrostatic and electromagnetic fields, skin effect
1-3	series-resonance
1-4	parallel resonance
1-5	quality factor (Q)

5.3.2 Advanced Components and Circuits - 002

2-1	germanium, silicon, gallium arsenide, doping, P-type, N-type
2-2	diodes - point-contact, junction, hot-carrier, Zener, etc.
2-3	transistors - NPN/PNP
2-4	field effect transistor (FET), JFET, MOSFET
2-5	silicon controlled rectifier (SCR)
2-6	amplifiers - classes A, AB, B and C
2-7	amplifier circuits - discrete and IC
2-8	operational amplifiers, properties and applications
2-9	mixers, frequency multipliers
2-10	digital logic elements
2-11	quartz crystal - properties and applications
2-12	advanced filter circuits - AF, RF

5.3.3 Measurements - 003

3-1	AC - peak, peak-to-peak, average, root mean square (RMS)
3-2	PEP, PEP relative to average power, PEP relative to voltage across load
3-3	dip meter, signal generator
3-4	crystal calibrator, marking generator, frequency counter
3-5	oscilloscope

3-6	meters, multimeter, power meter

5.3.4 Power Supplies - 004

4-1	transformer and rectifier circuits, voltage doubler circuit, PIP
4-2	filter circuits, bleeder resistor function
4-3	linear and switching voltage regulator circuits
4-4	regulated power supplies

5.3.5 Transmitters, Modulation and Processing - 005

5-1	oscillator circuits, phase locked loop (PLL)
5-2	RF power amplifiers
5-3	transmitters, neutralisation
5-4	AM, single sideband, linearity, two-tone test
5-5	FM deviation, modulation index, deviation ratio, deviation meter
5-6	FM transmitter, repeater circuits
5-7	signal processing - AF, IF, and RF
5-8	codes and protocols, Baudot, ASCII, parity, CRC, X.25, ISO layers
5-9	spread spectrum - frequency hopping, direct sequence

5.3.6 Receivers - 006

6-1	single, double conversion superheterodyne architecture
6-2	oscillators, mixers, tuning
6-3	RF, IF amplifiers, selectivity
6-4	detection, audio, automatic gain control
6-5	performance limitations - instability, image, spurious, etc.

5.3.7 Feedlines - Matching and Antenna Systems - 007

7-1	antenna tuner/transmatch, impedance matching circuits
7-2	velocity factor, effect of line terminated in non-characteristic impedance
7-3	antenna feed arrangements - tee, gamma, stub
7-4	current and voltage distribution on antenna
7-5	polarization, helical beam, parabolic antennas
7-6	losses in real antenna systems, effective radiated power
7-7	ground and elevation effects, vertical radiation (take off) angle
7-8	radiation resistance, antenna efficiency, beamwidth
7-9	waveguide, microstrip line

5.4 Examination procedures

Examinations are closed book. Reference material must not be made available during the examination. Use of calculators or any other similar device that are capable of storing information in memory is prohibited during the examination.

There is no time limit specified for examinations. Most examinations are completed within one hour and would normally not take more than two hours to complete. Examiners will use their discretion to ensure reasonable time is made available for candidates to complete the examination.

5.5 Re-examination

A candidate who fails a written test may retake the test as often as necessary, at the convenience of both the examiner and candidate. The examiner is required to provide a different examination for each re-examination.

▼ 6. Examiners

This section provides information on who conducts qualification examinations.

6.1 Accredited examiners

ISED has accredited examiners throughout Canada. Candidates are encouraged to contact local amateur clubs or technical schools, or visit ISED's Amateur radio operator certificates services website to find out who conducts examinations for the Amateur Radio Operator Certificate in their respective area.

Accredited examiners are free to negotiate an examination fee with

candidates in order to recover the cost of administering an examination. There is no remittance to ISED and ISED will not arbitrate any disputes between candidates and examiners.

6.2 ISED examiners

Most examinations are conducted by accredited examiners. In circumstances where this is not possible, ISED personnel may be able to conduct the examination. Candidates can contact the Amateur Radio Service Centre for assistance with their options.

▼ 7. Candidates

This section describes candidate eligibility as well as potential accommodations for examinations.

7.1 Age and nationality

There are no age or nationality restrictions for candidates who wish to take the examinations. Candidates must provide adequate photo identification to the examiner prior to the examination.

7.2 Disabilities

No candidate may be exempted from being tested for any of the qualifications of the Amateur Radio Operator Certificate.

Candidates who have a disability that prevent them from completing examinations in the normal manner should discuss their situation with their examiner to determine whether an accommodated testing procedure may be considered. The examiner may request an attestation from a medical practitioner.

7.3 Language

When a candidate fails a written examination because their normal language of use is neither English nor French, or because academic limitations restrict the ability to read the questions properly, the examiner may administer an oral examination.

▼ 8. Reciprocal operating agreements and arrangements

This section describes reciprocal operating agreements and arrangements between Canada and other countries/administrations. It also discusses communications on behalf of third parties.

8.1 Convention between Canada and the United States of America

The operation of amateur radio service equipment and stations in the territory of the other country is covered in Treaty Series 1952 No. 7, *Operation of Certain Radio Equipment or Stations: Convention between Canada and the United States of America*.

Visiting amateurs are not required to register or receive a permit prior to operating amateur radio stations.

Each amateur station shall indicate its geographical location as nearly as possible by city and state or city and province at least once during each contact with another station.

The amateur station shall be operated in accordance with the laws and regulations of the country in which the station is temporarily located.

Canadian amateurs operating in the U.S. have the same privileges as

they have in Canada, and are limited by U.S. band edges and mode restrictions, in accordance with the *Code of Federal Regulations*, Title 47, Chapter I — Federal Communications Commission, Subchapter D, Part 97 — Amateur Radio Service.

U.S. amateurs must be U.S. citizens and must abide by the *Radiocommunication Regulations* and RBR-4 while operating in Canada.

8.2 Temporarily operating Canadian amateur stations in other countries

Canada has negotiated participation in the following multilateral operating agreements, which allow Canadians to operate their amateur radio stations while temporarily visiting certain countries.

8.2.1 CEPT Recommendation T/R 61-01

CEPT is the acronym for Conférence européenne des administrations des postes et des télécommunications, translated as the European Conference of Postal and Telecommunications Administrations. CEPT's Recommendation T/R 61-01 is a licensing system that allows licensed amateurs from member and recognized non-member countries to operate in the other countries. A list of participating CEPT countries [PDF: 213 KB] is available online.

A Canadian-issued CEPT permit has no legal status in Canada.

In order to qualify for a CEPT licence according to T/R 61-01, a Canadian needs to hold an Amateur Radio Operator Certificate with Basic Qualification and Advanced Qualification and have their call sign on their certificate.

Amateurs who qualify for a CEPT T/R 61-01 licence must abide by the

provisions stipulated by the administration of the country in which the station is to be operated.

A foreign amateur with a CEPT T/R 61-01 licence who is visiting Canada will have operating privileges equivalent to a Canadian with an Amateur Radio Operator Certificate with both Basic Qualification and Advanced Qualification.

The Minister of Innovation, Science and Industry (the Minister) has delegated Radio Amateurs of/du Canada (RAC) to issue CEPT permits. The application for a CEPT permit requires the following information from the applicant:

- name
- address
- call sign
- class of certificate
- photocopies of the station licence and operator certificate

RAC has set a fee for this permit to cover the cost of administration and handling. More details about how to apply for a CEPT permit can be found on RAC's website.

8.2.2 International Amateur Radio Permit

The International Amateur Radio Permit (IARP) is a document issued pursuant to the terms of the *Inter-American Convention on an International Amateur Radio Permit*. Canada is a signatory to this convention. Other participating countries are listed on the Organization of American States website.

The IARP is issued in two classes: Class 1 and Class 2. Class 1 permits are issued to those who hold an Amateur Radio Operator Certificate

with Basic Qualification and Morse Code (12 w.p.m.), while Class 2 permits are issued to those who hold only the Basic Qualification. The Advanced Qualification and Morse Code (5 w.p.m.) are not considered when determining the class of the IARP.

Those who hold a Class 1 permit are authorized to use all frequencies and emissions allocated in the amateur radio service, while those who hold the Class 2 permit are limited to all the amateur allocations above 30 MHz, subject to the provisions of the visited country for the amateur radio service.

A Canadian-issued IARP has no legal status in Canada.

Foreign amateurs who are licensed by other administrations participating in the IARP programs must apply for the appropriate permit in accordance with the provisions stipulated by their home administration.

The Minister has delegated to RAC the authority to issue IARPs to Canadians. The application for an IARP requires the following information from the applicant:

- name
- address
- call sign
- class of certificate of the applicant
- photocopies of the operator certificate
- a recent passport-sized photo of the applicant

RAC has set a fee to cover the cost of administration and handling. More details about how to apply for an IARP can be found on RAC's website.

8.2.3 Other foreign operating arrangements or agreements

Any foreign administration may determine whether or not a Canadian amateur is permitted to operate an amateur station while temporarily in its territory, subject to such conditions or restrictions it may impose.

Information regarding operation in other countries can be found on RAC's website. Canadians are urged to contact the responsible administrations well in advance in order to obtain the necessary documentation and permission, where required.

8.3 Communications on behalf of third parties

Any foreign administration may permit its amateur stations to communicate on behalf of third parties without having to enter into any special arrangements with Canada.

Canada does not prohibit international communications on behalf of third parties.

In case of emergencies or disaster relief, international third-party communications are expressly permitted unless specifically prohibited by a foreign administration.

▼ 9. Radiocommunication Regulations and Regulations by Reference

The *Radiocommunication Regulations* can be found on the Justice Laws website.

Regulation by Reference RBR-4, *Standards for the Operation of Radio Stations in the Amateur Radio Service*, can be found on the Spectrum

Management and Telecommunications website.

Date modified:

2022-03-22