



Microwave Licence Application Evaluation Criteria

Introduction

Innovation, Science and Economic Development (ISED) evaluates licence applications for microwave stations¹ for their conformity to specific criteria set out in publications such as Spectrum Policy (SP) documents and Standard Radio Systems Plans (SRSP). General spectrum management principles described in the Radio Systems Policy General (RP-Gen) are also applied. It is the general nature of the spectrum management principles that sometimes leaves applicants uncertain of what will or will not be accepted. The most common sources of uncertainty are addressed in this document.

Application Evaluation Criteria

When evaluating microwave licence applications, ISED applies the spectrum management and administrative criteria presented in the table that follows.

Parameter	Applied Criteria
Automatic transmit power control	<p>Automatic transmit power control (ATPC) refers to a radio’s ability to automatically control the transmit power level as a function of propagation conditions. ATPC is allowed and encouraged but must not boost the power beyond any maximum limit specified in the applicable SRSP. In all cases, there is an expectation that applicants will refrain from using unnecessarily high levels. There is presently no limit on the duration the power boosts provided by the ATPC.</p> <p>Should interference be reported and shown to be caused by an ATPC boosted power, ISED will require that the licensee of the interfering station take corrective action.</p> <p>When ATPC is used, licence applications shall be submitted using the nominal transmitter output power (i.e. with no ATPC boost) and the corresponding nominal received signal level. In the “<i>Any other information supporting this application</i>” field of the Covering Letter, indicate the available ATPC range in dB.</p>

¹ A microwave station is a station in the fixed service operating in the following frequency bands: 932.5-935 MHz / 941.5-944 MHz, 953-960 MHz and above 960 MHz.

Availability	<p>Availability refers to the percentage of time on a yearly basis that a microwave hop is expected to be functional.</p> <p>ISED expects availability figures to be less than or equal to 99.999 % (commonly referred to as “5 nines”) for multi-hop links. This corresponds to approximately 5 minutes of hop outage per year due to propagation conditions. For single hop links, the availability should not exceed 99.99 % (commonly referred to as “4 nines”), however, 99.999 % will be accepted when in the interest of the public.</p> <p>When evaluating conformity to the expected values, the following criteria is applied:</p> <ul style="list-style-type: none"> • The availability figure is truncated at the last successive 9, it is not rounded. For example, 99.99989 % would be truncated to 99.999 %. • If automatic transmit power control (ATPC) is used, the fade margin used to calculate the availability is based on normal propagation conditions, i.e., without any ATPC power boost. • Availability improvement factors provided by the use of diversity techniques such space or frequency diversity are not taken into consideration. • Bi-directional availability is evaluated for bi-directional hops. • Calculations are performed using Vigants-Barnett and Crane models. 														
Radiated power	The nominal radiated power, i.e. with no ATPC boost, shall be set such as to not exceed the availability criteria.														
Hop length vs. frequency band	<p>Given that propagation losses increase with frequency, lower frequency bands should be used for longer hops while the higher frequency bands should be used for shorter hops.</p> <p>The following minimum hop lengths should be used as a guideline for band selection from a hop length perspective.</p> <table border="1" data-bbox="383 1066 1516 1365"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Minimum hop length (km)</th> </tr> </thead> <tbody> <tr> <td>960-8500</td> <td>30</td> </tr> <tr> <td>8500-11700</td> <td>15</td> </tr> <tr> <td>11700-15350</td> <td>10</td> </tr> <tr> <td>15350-19700</td> <td>5</td> </tr> <tr> <td>19700-23600</td> <td>3</td> </tr> <tr> <td>23600 and above</td> <td>-</td> </tr> </tbody> </table> <p>For multi-hop links, the longest hop may serve as the band selection reference for the entire link, including spurs.</p>	Frequency range (MHz)	Minimum hop length (km)	960-8500	30	8500-11700	15	11700-15350	10	15350-19700	5	19700-23600	3	23600 and above	-
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Frequency	<p>To the extent that it is technically possible, existing licensees are expected to reuse frequencies that have been previously licensed to them in the general vicinity of the planned hop provided these frequencies meet the other criteria specified in this table.</p> <p>In addition to consulting the SRSP and all other documentation relevant to the targeted band, new applicants are encouraged to consult their local ISED Spectrum Management Office (see “Consultation with ISED” at the end of this table) before selecting a frequency.</p>														

Spectrum efficiency	<p>Spectrum efficiency is specified in the applicable SRSP. It is calculated as follows:</p> $spectrum\ efficiency\ [b/s/Hz] = \frac{maximum\ bit\ rate\ (payload+overhead)[Mb/s]}{channel\ spacing\ of\ the\ frequency\ plan\ used\ [MHz]}$ <p>For co-channel dual polarization (CCDP) operation, spectrum efficiency is based on the maximum bit rate on a single polarization.</p>
Antenna mask	<p>A 3 dB tolerance is applied when evaluating the conformity of an antenna's radiation pattern to the applicable Standard Radio System Plan (SRSP) antenna mask. This means that the radiation pattern can exceed the mask by up to 3 dB before the antenna is declared as non-conforming.</p>
Adaptive modulation	<p>Adaptive modulation refers a radio's ability to change the bit rate and type of modulation as a function of propagation conditions.</p> <p>Spectrum efficiency is evaluated using the highest bit rate.</p>
High/Low conformity	<p>High/Low conformity is applicable to duplex channel deployments at a given site and refers to the segregation of all TX and RX frequencies to distinct frequency blocks.</p> <p>ISED expects that within 100 m of the proposed site, the proposed TX frequency will be in the same frequency block as any existing TX frequencies (licensed or pending authorization). The same applies to the proposed RX frequency.</p>
Domestic coordination	<p>New and modified microwave hops must not cause interference to hops under study or existing licensed hops. ISED will request that the applicant coordinate with other Canadian applicants and licensees if its technical analysis shows potential interference.</p> <p>A coordination request must be responded to within 30 calendar days of the request date. Failure to respond within this time limit will be considered by ISED as acceptance of the proposed hop.</p> <p>Applicants may initiate domestic coordination prior to submitting the licence application to ISED. The 30 day response period starts on the day the coordination request is sent.</p> <p>Applicants that carried out domestic coordination before submitting the licence application to ISED may include in the application the specific names of the licensees successfully coordinated with. Names of associations or other group names that are not the concerned licensees will not be accepted.</p>
Licence fees	<p>Licence fees for fixed stations communicating with other fixed stations using digital radios are based on the Equivalent Number of Telephone Channels (ENTC) calculated as follows:</p> $ENTC = \frac{maximum\ bit\ rate\ (payload + overhead)[Mb/s]}{0.064\ [Mb/s]}$ <p>(Radiocommunication Regulations, Article 58(c).)</p> <p>For co-channel dual polarization (CCDP) radios, the ENTC is based on the sum of the bit rates on the vertical and horizontal polarizations.</p>

Station location name	<p>The station location name is expected to contain only information that identifies the civic address of the station. This includes the civic number and street name, municipality name and the province abbreviation used by Canada Post. For well-known geographical sites, the site name and province abbreviation can be used instead of the civic number and street name.</p> <p>Any other information will be removed. Licensee-specific station identifiers (e.g. site ID number, station name, etc.) can be entered in the “<i>Licensee Station Reference</i>” field located at the station level in the licence application.</p>
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Consultation with ISED

If there are any doubts concerning the acceptability of an intended microwave system, applicants are strongly encouraged to consult the ISED Spectrum Management Office responsible for the region where the microwave system is to be deployed in the early stages of the project.

The addresses of ISED Spectrum Management Offices can be found in the Radiocommunication Information Circular number 66 (RIC-66) which can be found at the following Internet site: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf06073.html.