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Spectrum Management and Telecommunications

Spectrum Utilization Policy, Technical and Licensing Decisions on a Portion of the Band 14.5-15.35 GHz for Tactical Common Data Link (TCDL) Systems

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1. Intent

This spectrum utilization policy, announced in *Canada Gazette* Notice DGTP-012-09, addresses principal issues governing the implementation of TCDL systems in the band 14.5-15.35 GHz band, including changes to the *Canadian Table of Frequency Allocations* and the associated transition policy, licensing fees, as well as technical and service rules.

2. Background

The band 14.5-15.35 GHz is currently allocated to the fixed service, on a primary basis, and to the mobile service, on a secondary basis, for the exclusive use of the Government of Canada. At present, this band is shared by the fixed service and by the Government of Canada under a coordination agreement for operation near Canadian Forces Bases in Canada.

The band 14.5-15.35 GHz is used by wireless service providers to provide data services, including cellular backhaul. The Department of National Defence (DND) has historically used the band for training purposes in Canada, and has required protection from harmful radio interference only around specific Canadian Forces Bases. This band is used for several DND systems, including tactical radio-relay systems and existing unmanned aerial vehicles (UAV).

Part of DND's mandate is to increase the use of aerial surveillance, specifically intelligence surveillance and reconnaissance (ISR) operations, in order to meet Canada's sovereignty and security needs. ISR operations are supported by the use of TCDL equipment, which transmits a variety of digital information, including voice, video and data to and from airborne platforms, such as long range patrol aircraft, fighter aircraft, helicopters and UAVs.

TCDL equipment is based upon a NATO technical standard¹ and is used by all NATO members, including New Zealand and Australia. The United States, the United Kingdom, New Zealand, Australia and most NATO countries (with the exception of Canada) have already reserved all or parts of the band 14.5-15.35 GHz for government and military use. NATO standards identify this frequency band for airborne tactical data links and interoperability between NATO members as an essential operational requirement. In the United States, Congress has required the use of TCDL as necessary data link technology for all future UAV purchases.

The critical aerial surveillance role provided using this equipment requires periodic 24/7 operation, including in and around urban centres during civil emergencies or special events. However, TCDL equipment is technically incompatible with commercial fixed terrestrial service systems.

DND has identified a critical requirement for exclusive Government of Canada nationwide use of radio spectrum in the bands 14.66-14.82 GHz (air-to-ground link) and 15.135-15.295 GHz (ground-to-air link) to support ISR operations. Industry Canada and DND have carried out extensive work over the past three years to define spectrum requirements to fulfill DND's mandate, while posing a minimal impact to current fixed service incumbents. The bands 14.66-14.82 GHz and 15.135-15.295 GHz have been identified to achieve this goal.

¹ NATO Standardization Agreement (STANAG) 7085

Since June 2006, Industry Canada has been discouraging the use of these bands by the fixed service, but permitted new licensing on a case-by-case basis where fixed licensees were able to provide appropriate justification.

3. Recent Developments

Through the December 2008 *Consultation Paper on Using a Portion of the Band 14.5-15.35 GHz for Tactical Common Data Link (TCDL) Systems* (DGTP-004-08), Industry Canada consulted with affected stakeholders on the best way to address DND's requirements and to minimize the impact on fixed incumbents. A spectrum advisory bulletin (SAB-001-08) was also issued in December 2008, announcing a moratorium on licensing of new fixed services in the bands 14.66-14.82 GHz and 15.135-15.295 GHz, while the Department assessed possible policy amendments to these bands.

In response to this consultation, seven comments were received. These comments generally supported the Department's proposal to open a portion of the band 14.5-15.35 GHz for TCDL systems. The most contentious issues related to that of transition policy provisions for incumbent licensees.

Details of the spectrum policy, licensing and transition provisions, proposed licensing fees, channelling plans and technical requirements are outlined below.

4. Spectrum Utilization

Currently, the *Canadian Table of Frequency Allocations* allocates the band 14.5-15.35 GHz to the fixed service, on a primary basis, and to the mobile service for the exclusive use of the Government of Canada, on a secondary basis, under footnote C5. The band is also allocated to the space research (passive) and earth exploration-satellite (passive) services, on a secondary basis, under international footnote 5.339.

In DGTP-004-08, Industry Canada proposed to subdivide the band 14.5-15.35 GHz and to add a new Canadian footnote that would modify the designations and ensure that DND's TCDL operations are protected. In this proposal, 160+160 MHz of spectrum would be reallocated for exclusive Government of Canada use. The Department further proposed a transition policy wherein incumbent fixed station operators would be afforded a five-year notification period. Five years after the date served in the notification, fixed station operators would no longer be protected, but could continue to operate on a no-protection basis. Finally, beginning 10 years after the date served in the notification, fixed station operators would not be permitted to interfere with TCDL operations and could remain in operation only if they were able to demonstrate that they would not adversely affect TCDL operations.

Comments received from the fixed service community indicated that it does not believe that there is a need to implement the Canadian footnote immediately and that the proposed footnote should not be put into effect until five years from the date of release of the Department's decision on this consultation. Other comments from the fixed service community indicated that it does not support an exclusive allocation for Canada-wide TCDL operations in these bands, as it believes that

Industry Canada should permit the continued operation of incumbent fixed service systems where such systems will not interfere with proposed TCDL systems.

Comments received from DND indicated that TCDL equipment is not compatible with fixed service systems and that such systems should be displaced or only be permitted continued operation on a secondary basis to TCDL systems, at the end of the initial five-year period. This is due mainly to DND's requirement to be able to react to various situations within Canada at any time, potentially without notice and for extended periods. DND believes that Industry Canada should issue such formal notifications to incumbent fixed service system operators with the release of this document.

With the provisions being proposed, DND has pointed out that, should one leg of a fixed service duplex link cause harmful radio interference, DND could lose control of airborne camera systems and UAVs during take off, flight or landing, or lose reception of important ISR data. The proposed provisions for continued FS operation beyond the initial five-year period would render this band unusable for DND until after 10 years have passed. Consequently, DND feels that co-primary status of TCDL systems with fixed service systems is not a viable option.

Although Industry Canada agrees that proposed provisions for the continued operation of the fixed service beyond the initial five-year period could impair the use of the band for safety-sensitive control applications (such as command and control of UAVs) in certain areas, this represents only one of a class of radio applications proposed for this band. Other proposed applications, such as transmission of ISR data to receivers on the ground, would be viable during this period. In light of this, the Department has decided to maintain its original position of a two-stage transition policy.

The band 14.5-15.35 GHz will be modified in the *Canadian Table of Frequency Allocations* as follows:

14.5-14.66	FIXED Mobile C5
14.66-14.82	FIXED MOBILE C5 C41
14.82-15.135	FIXED Mobile C5
15.135-15.295	FIXED MOBILE C5 5.339 C41
15.295-15.35	FIXED Mobile C5 5.339

Consequently, the Department has made the following decision with respect to Canadian footnote C41.

Decision:

Industry Canada has adopted the following footnote to be incorporated into the *Canadian Table of Frequency Allocations* to accommodate DND's requirements for TCDL operation.

C41 The use of the bands 14.66-14.82 GHz and 15.135-15.295 GHz is designated for government-exclusive aeronautical mobile applications in the mobile service. Prior to October 1, 2013, government-exclusive aeronautical mobile applications shall not cause harmful interference into fixed service systems. Beginning on October 1, 2013, fixed service systems may continue to operate, but shall not claim protection from government systems operating in the aeronautical-mobile service. Beginning on October 1, 2017, fixed service systems may continue to operate in these bands, but shall not cause harmful interference to government systems operating in the aeronautical-mobile service.

4.1 Remaining Fixed Service Spectrum

The remaining 530 MHz of radio spectrum within the band 14.5-15.35 GHz (less the 100 MHz currently designated for remote TV-pickup) will continue to be available for line-of-sight low, medium and high capacity fixed service systems. The related channelling plan is identified in Standard Radio System Plan SRSP-314.5, *Technical Requirements for Fixed Line-of-Sight Radio Systems Operating in the Band 14.5-15.35 GHz*.

In its consultation, Industry Canada proposed changes to the channelling plan for the band 14.5-15.35 GHz to permit the use of five and 10 MHz-wide channels in the remaining fixed service spectrum sub-bands 14.5-14.66 GHz and 14.975-15.135 GHz. The Department also proposed to permit the use of 20 and 40 MHz-wide channels in the sub-bands 14.82-14.875 GHz and 15.295-15.35 GHz.

Comments received from the fixed service community supported these proposals, but added that 30 MHz and 50 MHz-wide channels should also be permitted to allow for greater flexibility and spectrum efficiency, which is consistent with the use of this band for fixed service backhaul.

Decision:

Industry Canada will undertake a revision of SRSP-314.5 in consultation with the Radio Advisory Board of Canada. This revision will include the use of 5, 10, 20 and 40 MHz-wide channels in additional sub-bands as proposed in the Department's consultation. In addition, 30 and 50 MHz-wide channels will be considered, where appropriate, in the remaining fixed service spectrum. These changes will provide greater flexibility and spectrum efficiency for fixed service systems in the remaining spectrum.

5. Transition Policy Provisions

As part of consultation DGTP-004-08, Industry Canada proposed transition policy provisions (see Section 4) to facilitate the implementation of TC DL operations in Canada, while ensuring the orderly displacement of fixed service systems. The views expressed on these proposed transition provisions were polarized.

Comments received from the fixed service community on the Department's proposed transition provisions with respect to TC DL operations indicated that it supports the proposal of a two-stage implementation with five- and 10-year implementation period, but the fixed service community believes that it should be permitted to continue operation within the bands 14.66-14.82 GHz and 15.135-15.295 GHz for the second five-year period on a no-protection, no-interference basis. The fixed service community also believes that quicker displacements should be permitted only if mutually agreed upon, and if funded by TC DL proponents, although DND has already indicated that it lacks sufficient resources to help fixed service providers vacate these bands.

Comments received from DND on the proposed transition policy provisions indicated that a shorter notification period than five years is required given that Industry Canada has been discouraging licensees from using this band since June 2006, and established a moratorium in 2008 to restrict fixed service implementation until departmental decisions could be made. DND also argued that, as outlined in the October 2007 Speech from the Throne, the government had identified strengthening Canada's sovereignty and the security of Canadians as two of its priorities, along with increased U.S. government ISR operations (the U.S. departments of Defense and Homeland Security). According to DND, the U.S. Department of Defense plans to carry out its own ISR operations along the Canada/United States border, including during the Canadian 2010 Vancouver Olympics, without the use of filtering to prevent harmful radio interference from being caused to Canadian fixed service providers.

DND believes that potential harmful interference from such U.S. TC DL operations near the border can be mitigated if DND's transition to the 2 x 160 MHz slots is completed in a timely fashion. According to DND, such action would also protect remaining and displaced Canadian fixed microwave systems operating in adjacent bands.

In light of these issues and the comments raised, the following provisions for use of the bands 14.66-14.82 GHz and 15.135-15.295 GHz apply:

- (1) Effective October 1, 2013, fixed station operators will no longer be afforded primary service allocation status, but may continue operation on a no-protection basis from TC DL stations.
- (2) Effective October 1, 2017, fixed station operators must not cause harmful interference to TC DL operations, and may continue operation only if they are able to demonstrate that they will not adversely affect TC DL operations.
- (3) Displacement earlier than the above dates may be achieved through mutually acceptable arrangements between the TC DL operators and affected fixed service operator(s).

- (4) Industry Canada will retain oversight of the displacement process and will assist, where appropriate, affected fixed licensees in identifying replacement frequency assignments.
- (5) Industry Canada will monitor the effectiveness of spectrum policy provisions related to the displacement of fixed systems. In the long term, changes to these provisions and/or licence conditions may be made to ensure that the continued availability of spectrum for TC DL systems is accomplished in the most efficient manner.

Radio station data associated with affected incumbents can be found via the Radio Frequency Search section of Industry Canada's Spectrum Direct website, available at <http://sd.ic.gc.ca>

6. International Coordination

Comments received from the fixed service community recognize that a cross-border arrangement does not currently exist between Canada and the United States for use of the band 14.5-15.35 GHz and that fixed service providers in Canada have not been required to coordinate with U.S. systems in the past. Further, the fixed service community understands that the entire band is allocated for federal government use in the United States. The fixed service community has requested that the Department undertake discussions with the United States with the goal of developing an agreement for the United States to limit its operations in the sub-bands 14.66-14.82 GHz and 15.135-15.295 GHz near border areas.

Fixed service stakeholders further recommend that, during such negotiations with the United States, the Department should strive to maintain the status quo with respect to cross-border operation for the remainder of this band (i.e. an agreement that ensures that no coordination will be required of Canadian fixed service operators).

Decision:

The Department will carry out due diligence in the establishment of cross-border arrangements with the United States for use of the bands 14.66-14.82 GHz and 15.135-15.295 GHz to ensure continued protection of fixed systems in Canada. In the interim, international coordination is not required by operators of fixed service systems in this band. Fixed service licensees will be subject to any international agreements that may be established in the future.

7. Technical Characteristics of TC DL

The TC DL airborne system is designed for compact, lightweight radio applications on piloted aircraft and UAVs. The data rates, modulation techniques and transmission frequencies are fully interoperable with other ground based and ship borne TC DL systems. Such systems use a variety of waveforms and data rates up to 274 Mbps. Associated antenna radiation patterns may be omnidirectional or directional.

The amount of spectrum proposed for TC DL operations (160 MHz uplink and 160 MHz downlink) will allow for two or more platforms within a given geographical area. The actual transmit power of each TC DL unit will vary by platform.

In its consultation, Industry Canada indicated that it would establish out-of-band emission limits for aeronautical mobile TC DL applications in order to protect fixed systems operating in adjacent radio spectrum. In response, the fixed service community has indicated that its operations in the remaining fixed service spectrum will rely on the use of transmit filters by TC DL systems to avoid causing radio interference to adjacent band fixed service systems. Fixed service stakeholders have requested that the Department ensure that such filtering is effective. Despite these concerns, DND is very confident that such filtering will effectively protect adjacent band fixed service systems.

Decision:

Industry Canada will ensure that adequate technical specifications are established for TC DL operations in the bands 14.66-14.82 GHz and 15.135-15.295 GHz to protect fixed service systems in adjacent bands. Detailed specifications will be developed in consultation with the Radio Advisory Board of Canada.

8. TC DL Licensing Process

Comments received from the fixed service community indicated that it understands that, during the first portion of the anticipated displacement period, DND would continue to conduct TC DL training exercises in these bands only in specific areas (as is the case today), and only after adequately demonstrating to Industry Canada that DND will not cause interference to existing fixed service systems within the same bands. Licences or Letters of Approval for such interim use of TC DL will continue to be issued on a no-interference, non-protection basis.

Decision:

Industry Canada will proceed, where appropriate, with the issuance of licences to the Department of National Defence in order to permit Canada-wide operation in the bands 14.66-14.82 GHz and 15.135-15.295 GHz.

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