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Before
INDUSTRY CANADA
Spectrum Management and Telecommunications

Proposed Spectrum Utilization Policy, Technical and Licensing Requirements to Introduce Dedicated Short-range Communications-based Intelligent Transportation Systems Applications in the Band 5850-5925 MHz	)
DGTP-003-07 March 2007	)
Spectrum Management and Telecommunications Policy	)

COMMENTS OF MARK IV INDUSTRIES CORP – IVHS DIVISION

Mark IV IVHS[1] hereby responds to the Gazette Notice (Industry Canada, DGTP-003-07, March 2007) inviting comments on proposals to introduce Dedicated Short-range Communications (DSRC) systems in support of Intelligent Transportation Systems (ITS) applications in the band 5850-5925 MHz, specifically comments on the definition and applications of DSRC-based ITS applications, as well as technical and licensing criteria.

We support the Department's continuing initiatives to define policy for the use of DSRC in the 5850-5925 GHz band. This recent consultation on the introduction of new DSRC-based ITS applications is important and timely since the first DSRC Proof of Concept system will be deployed for trials in the United States in the 2007 calendar year. Given the strong presence of automotive capabilities in Canada, and the high volume of automotive traffic to and from the

[1] MARK IV IVHS, part of the MARK IV Transportation Technologies Group, is a designer and manufacturer of DSRC devices that are widely used by highway, toll, turnpike, tunnel, and bridge authorities to enable intelligent transportation systems such as electronic toll collection and automated weigh station bypass. MARK IV IVHS supplies the majority of electronic toll collection equipment in North America. With more than 17 million toll transponders in service in North America, MARK IV has enabled many landmark intelligent transportation system deployments, including: Canada's Highway 407 ETR, the world's first, non-stop, all-electronic toll road; pioneering border crossing projects; and, the E-ZPass[sm] system of the Interagency Group of 23 toll authorities. Mark IV has also been the lead developer of 5.9GHz DSRC hardware for USDOT, to help prove the standards and to support the VII program.

United States, Canadian policy is well served if the Department addresses DSRC capabilities for the domestic market, with a view to being interoperable with equivalent radio spectrum uses in the United States.

We make the following general recommendations in response to the Gazette Notice:

(1) Interoperability with US standards and deployments is essential. For example, when an automobile is manufactured in Windsor, Ontario and is driven in Lexington, Kentucky, the driver and passengers should be able to enjoy the benefits afforded by any deployed safety systems, regardless of the jurisdiction in which it is registered or manufactured. So if there is a signalized intersection providing anti-collision features, for example, a car from either country ought to be able to take advantage of that life-saving service. We do not foresee immediate need for interoperability with other nation's systems, just with the USA.

(2) Interoperability of Public Safety applications implemented on DSRC networks. An essential communication link is required within public safety and public service wireless communications systems which permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results. The ASTM and IEEE standards need additional support by public stakeholders such as Transport Canada and Industry Canada so that the safety message priorities can be established as required.

(3) Standards development will require additional support from the public sector. In our view, it would speed up efforts if Transport Canada representatives could drive the establishment of safety message prioritization. Also, as deployment for safety systems begin, there will be a need to complete designs and implementation of security features. While private industry is working on that aspect, it would be wise to have public sector coordination, to ensure widespread availability of security solutions and to ensure safe keeping and proper management of encryption keys (if applicable). The time to act on these issues is urgent, while automotive OEMs are still at a pre-competitive stage.

DISCUSSION

1. DSRC Definition

We concur with the FCC definition of Dedicated Short-Range Communications Services (DSCRS) but propose for additional clarity to update that definition under Department policy as follows because DSCRS will be provided over systems or networks requiring the integration of multiple technologies:

"DSRC systems are systems containing multiple radio equipments that use radio techniques to transfer information over short distances between roadside and mobile units, between mobile units, and between portable and mobile units to perform operations related to the

improvement of traffic flow, traffic safety, and other intelligent transportation systems applications, for the mobile units in a variety of environments. DSRC systems may also transmit status and instructional messages related to the units involved." [Mark IV's proposed amendments are underscored.]

See also Attachment A hereto which illustrates the various elements of a prototype DSRCS system or network.

2. DSRC Applications

We concur that the groupings cover the known range of ITS applications for DSRC. We also note that, as described above, the applications being supported by the DSRCS may operate on different equipment than that covered by radio equipment certification and even licensing, since on the roadside the applications may be remotely connected to the equipment over the Internet, and that appropriate controls will be necessary to ensure proper management of the use of the spectrum resources.

We also note that new IEEE standards are being developed (the IEEE 1609 family, now released as trial use specifications, and the IEEE 802.11p draft amendment to the current IEEE 802.11 standard), that are intended to replace or amend the current ASTM 2213-03 standard, which is currently approved for use in DSRCS by the FCC. As part of the IEEE 1609 activities, the IEEE Registration Authority Committee (RAC) has defined that all applications for use in the DSRC communications, compliant to the IEEE standards, be registered by the application developers/owners with the RAC using a non-hierarchical 4-byte numeric identification system. This non-hierarchical system may make it more difficult to classify applications into the defined groupings.

DSRC systems require a significant network structure to interconnect RSUs to central systems for management of security, device authentication and management of privacy. We also note that most applications will not reside on RSUs, but rather exist on network nodes which may be far removed from the RSUs. This may be observed in the system configuration shown in Attachment A. The RSU acts like a communication node with specific management aspects that permit remote applications to register to provide over-the-air DSRC services, in some respect like other 802.11 wireless access points, however with substantially more management for application control security provisions.

We recommend that the Department consider how the applications to be used in DSRCS networks in Canada should be categorized and administered to ensure that the channel selection and usage requirements are respected, for example, to require that an RSU refuse to connect applications to channels that do not comply with the channel regulatory usage. We believe the Department or Transport Canada should have a role in the authorization and approval for applications carried on the radio channels.

We also believe that Transport Canada and/or the Department should play a role in ensuring that the DSRCS network(s) serving Canada (1) should not be subject to potential

monopoly control and (2) should be required to provide non-discriminatory access to such network(s). We prefer provisions to be established such that the network provider must provide non-discriminatory access.

3. DSRC Operations

We believe that the description of DSRC Operations in Section 3.3 of the Gazette Notice should be clarified and edited to conform the current standards defined by the IEEE, in particular the use of "request to send (RTS)", is not part of the referenced standards. We include below an edited version of paragraphs in Section 3.3 containing such clarifications and edits:

RSUs and OBUs are expected to communicate using short-range, low-power data transmissions of limited duration. The communications are organized on a "Provider-User" basis, namely one device offers (provides) application services and other devices use the service. An RSU is always a Provider while an OBU can be a Provider or a User but not both at the same instant in time. Except where specifically excluded, OBU operation is permitted wherever vehicle operation or human passage is permitted. OBUs may communicate with RSUs or other OBUs. It is also possible that RSUs may need to communicate with other RSUs.

A control channel is accessible throughout the country (and hopefully right across North America) and establishes a communication link between a Provider and User(s). Specifically, a Provider broadcasts data on the control channel offering application services to Users in its communication zone and provides channel assignments and operating instructions to them. Multiple Providers may have overlapping coverage and will contend for time to transmit this information on the control channel. When tuned to the control channel, all RSUs and OBUs listen by default for a transmission. If an RSU or an OBU attempts to transmit a message but detects the broadcast of another message on the control channel, it must wait before transmitting. All User devices are required to listen to the control channel every few hundred milliseconds to check for messages from Providers.

In between the control channel intervals, all devices may transmit messages on the control channel or on one or more service channels, when so directed by the operating instructions of the Provider associated with each application. Multiple applications can simultaneously share each channel. As on the control channel, all transmitting devices contend for the communication medium on each service channel. The timing of the transitions between the control channel and service channels is controlled by time synchronization of all devices to Universal Coordinated Time, for example via the Global Positioning System.

The control channel is restricted to only short messages while all internet protocol (IP) messages are required to utilize the service channels. Priority is established both by application priority levels and by message priority queues on each channel. Specifically, the communication managers in each device operate using a set of rules to provide a quality of service (QoS) that includes access time, access priority, and channel capacity service to RSUs and OBUs.

4. Band Plan

We note that the ASTM-DSRC standard channeling plan has been embodied in the draft 802.11P standards. We concur with adoption of the proposed channeling plan and also believe that it is important to adopt the U.S. designations for channels 172 and 178. This will enhance the ability to provide the safety applications in a homogenous manner across North America, and allow common vehicle standards to be employed.

We also note that there are concerns among the industry stakeholders developing and trialing the DSRC in the U.S. that the current mechanism of time multiplexing between control and service channels results in loss of spectral efficiency, since any channel will only be occupied for a fraction of the time, and stations with overlapping coverage must share the control channel. We therefore recommend that the Department retain flexibility in the channel plan to allow future adoption of more efficient usage of the 75 MHz band, for example the use of wider band channels and time multiplexing between application groups on such channels.

5. U.S. Approach

We note the fact that current IEEE standards define OBUs as Providers (as well as Users) may have implications for the licensing of OBUs. For example, under Part 90 FCC rules, RSUs (which are always deemed Providers) are individually registered in the FCC's ULS registration database and are subject to coordination. Also there is a first come rule for interference protection for RSUs relating to non-priority communication. The FCC's rules do not specify how mobile or portable OBUs should be treated for registration, coordination and interference protection purposes if they are operating as Providers. These issues have not yet been addressed by the FCC. We believe the Department would be prudent to develop specific licensing methods applicable for such OBUs used as Providers.

6. Radio Authorizations

We believe that both radio licensing and spectrum licensing have their roles and drawbacks for DSRC-based ITS applications. In particular, we believe the spectrum licensing method is appropriate for public sector and large operator needs. But we also believe that the diversity of DSRC applications will attract widespread commercial and private uses and that it might be appropriate also to make available radio licensing to private sector entities that are developing and promoting such applications.

For example, in an urban area, some sites may offer electronic toll services, others parking, others automatic fuel payment, others access control/fleet management services. All sites may offer navigation updates and traffic information, and be used to collect information for traffic management purposes. No single public or private entity encompasses all of these applications and it may not be prudent to limit the development of these diverse applications by spectrum licensing. Also where multiple licensees are permitted in the same area, the sharing of the control channel has significant implications on coverage areas for individual sites. Also there may be a need for coordination between public and private sector sites for the same reason.

We also feel that there may be merit in not requiring licensing for the smaller coverage area RSUs, since this may promote the adoption of DSRC in the private sector, in particular where applications involving electronic payment are likely to be locally restricted in coverage by nature. We suggest licensing by rule for small zones (e.g. 15m) and license by site for higher power units.

7. Licensing OBUs and RSUs

We concur that RSUs will require licensing, either through radio or spectrum licensing, and that User-only OBUs should not require individual licenses. As discussed above, we note that the current IEEE standards define OBUs as either Providers or Users which may have implications for the licensing requirements applied to OBUs. We believe the Department would be prudent to develop licensing methods applicable for such OBUs, separate from those for User-only OBUs.

We also concur that equipment authorization should require equipment compliance to the standards to the extent defined in section 8.

8. ASTM Standard

We believe that there is a definite need to segregate public and private sector functions for the purpose of application management and to promote private sector involvement in the promotion of DSRC. However there is also merit in allowing co-sharing of the channels on RSUs between public and private applications, to promote the services. However this may result in imbalance in competition for provision of services.

The ASTM standard does not define the network aspects of the DSRC systems, nor for that matter neither does the current IEEE 1609 standards, although the latter do provide more definitive information about the network access and application interfaces to utilize the communication capabilities.

We believe that aspects of the ASTM and IEEE standards should be controlled through regulation, such as coverage zones, EIRP, transmit power, spectral emissions and modulation, but that other aspects should be relegated to the industry standards bodies and not embodied in regulation. We believe that the industry will be self regulating in this manner. However we also see that in the early adoption years, requiring that radio devices be industry certified as compliant to a limited set of standards will ensure a homogenous deployment nationwide.

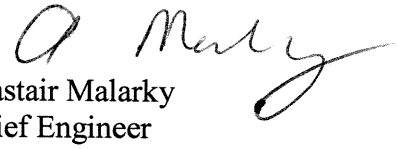
We also note that the ASTM standard requirements have been embodied and updated in the current IEEE 1609 and IEEE 802.11p standards and that when the latter is approved, the ASTM working group is expected to update the ASTM standard accordingly. We believe that there would be merit in the direct incorporation of the regulatory requirements within the FCC and Department technical standards, and the rest of the ASTM standard being subsumed into the

IEEE standards. Currently it is not clear which parts of the ASTM standard are truly regulatory and which parts are industry standards for equipment compatibility.

9. Power Limits

We support adoption of the Department's proposed power limits because they are consistent with the ASTM standard and with IEEE standards in development.

Respectfully submitted,



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Attachment A : How DSRC Enables Vehicle Infrastructure Integration (VII)