September 12, 2002

Mr. Jeffrey Paniati
Acting Director, ITS Joint Program Office
Federal Highway Administration
400 7th Street, S.W.
Room 3401
Washington, D.C. 20590

Dear Mr. Paniati:

We are pleased to transmit this third letter report of the Transportation Research Board's (TRB) Committee for Review of the U.S. Department of Transportation's (DOT) Intelligent Transportation Systems (ITS) Standards Program. This report, based on the committee's discussions at its most recent meeting, presents conclusions and recommendations concerning the focus of DOT's programs on encouraging rapid deployment of ITS-standards, that is, their dissemination and use in ITS installations.

BACKGROUND

This report was produced under TRB's continuing study to advise DOT on matters arising from ongoing and planned activities of the ITS Standards Program, with emphasis on DOT's role in achieving widespread adoption of ITS infrastructure standards in practice. The study is being conducted by a committee appointed by the National Research Council (NRC) and at the request of the DOT's Joint Program Office (JPO), which is responsible for developing a national architecture and selected standards to encourage the development and deployment of ITS technology in the United States. A list of the committee's present membership is shown in Enclosure 1.

In accordance with the study plan the committee meets three times each year to review issues arising from JPO's ITS Standards Program and presents the outcome of its deliberations in one or more reports. Issues considered by the committee to date include processes for standards development, obsolescence and long-term maintenance of standards when technology is rapidly evolving, the appropriate federal posture toward participation in international standards-setting forums, and strategies for overcoming obstacles to effective standards deployment.

Each of the committee's meetings has been approximately 2 days in length, held at the NRC's facilities in Washington, D.C. Each has included JPO staff presentations of relevant aspects of

the current status, activities, and plans of the ITS Standards program, as well as participation by knowledgeable guests. This year's first meeting was held June 6 and 7, 2002. The meeting's agenda is shown in Enclosure 2.

STANDARD FOR DEDICATED SHORT-RANGE COMMUNICATIONS AT 5.9 GHz

At this meeting, the committee discussed JPO's activities supporting development of a dedicated short-range communications (DSRC) standard. Joining the committee and DOT staff for much of this discussion were three individuals—Lee Armstrong, Broady Cash, and Jules Madey—who have taken leadership roles in developing the standard and applying DSRC and related technologies. Mr. Armstrong is technical program manager for the DSRC standardization program of the American Society for Testing and Materials. Mr. Cash chairs the 5.9 GHz–band DSRC Architecture Standard writing group and the Physical and Medium Access Control Standard writing group. Mr. Madey, Director of Technology Development for the New York State Thruway Authority (a DSRC-user agency), has been involved in the development of the performance specification for OmniAir™, an electronic toll collection concept being developed by the International Bridge, Tunnel and Turnpike Association.

The discussion at the meeting focused on current efforts to develop standards for DSRC in the 5.9 GHz frequency band. Because the potential applications of DSRC are so broad, DSRC standards potentially will shape the activities—and markets—of a wide range of industries. As the committee's guests acknowledged, many observers have deemed an earlier attempt to develop a standard in the 915 MHz band a failure. This failure is attributed largely to participants' inability to resolve conflicts among the interests of companies already involved in providing products and services using that band.

The current standard-development effort focused on the 5.9 GHz band, being facilitated by JPO, is widely viewed as an emerging success story, although the committee notes that its success will ultimately be determined by the standard's effective deployment. In the absence of entrenched commercial interests of equipment vendors and with better definition of the requirements to be met by the standard, participants have reached key agreements. The committee understands that industry consortia are prepared to begin manufacturing chipsets and hardware conforming to the DSRC standard, and several vehicle manufacturers have expressed strong interest in applying the DSRC technology.

A potential concern with DSRC is the absence of the infrastructure, such as roadside antennas, needed to enable these applications. Some in attendance at the meeting suggested that the market for DSRC could be very large; however, clearly defined business models—and the key applications likely to drive consumer adoption of DSRC technology—have not yet emerged.

DOT staff members have suggested that public safety applications might justify public investment in the development of this roadside infrastructure. In discussing the point, committee members indicated that building on existing toll collection systems might be an effective means of encouraging both deployment of DSRC technology and incremental development of DSRC infrastructure. The committee notes that, despite the failure to gain widespread acceptance of a comprehensive DSRC standard for ITS, the more narrowly targeted 915 MHz toll tag technology

has now been deployed successfully to more than 10 million users.   The committee believes this limited success within a broader failure offers both lessons and opportunities.

Despite the conflicts within the earlier standards-development process, electronic toll collection is now an established market and has yielded significant public benefits. That market and its institutional framework could represent an opportunity for more rapid deployment of other DSRC technology. Toll tags have been in use for approximately 6 years; batteries in the oldest tags are approaching the end their 7-year expected service life. The need to replace these tags offers an opportunity to introduce a DSRC in-vehicle box that might then be used for other applications. The committee understands that the price for this new box might initially be as high as $100, but could drop to perhaps $25 in 4 to 5 years as technology evolves and the market expands. These prices are higher than those for existing toll tags, but do not appear to be unreasonable for user acceptance. The incremental infrastructure costs of adding 5.9 GHz to existing toll collection installations is estimated to be small.

Committee members agreed with their guests, both DOT staff and others, that a marketing plan is needed for DSRC—a plan of activities to encourage deployment of DSRC technology**. The committee recommends that sponsoring the preparation of such a plan be regarded as an appropriate component of DOT's standards development program.** The public benefits of DSRC will depend on the proportion of the vehicle fleet equipped with DSRC capabilities: these benefits increase linearly with the miles of DSRC-equipped roadway, but exponentially with the number of equipped vehicles. Thus activities to encourage rapid adoption of in-vehicle DSRC capability arguably merit inclusion in DOT's ITS Standards Program.

STANDARDS DEPLOYMENT STRATEGY

What will make the standard for DSRC at 5.9 GHz a true success story is its effective deployment. At the meeting, the committee noted that JPO's efforts have yielded other successes, such as industry's adoption of National Transportation Communications for ITS Protocol object definitions for dynamic message signs (NTCIP for DMS). Such successes confirm the value of DOT's standards program. Comparing these and other less successful standards efforts, the committee commented on the tension between the need to expedite the delivery of the standards and the need to demonstrate successful applications of the standards to ensure they can be used in practical ITS installations.

Since the initial release of the National ITS Architecture was completed in mid -1996, JPO's activities have supported work by ITS users, suppliers, and other stakeholders to develop and encourage the use of some 80 or more distinct standards. The committee observes that some of these standards are more crucial than others to realizing the goals of the National ITS Architecture. Therefore, JPO should focus its efforts on encouraging use primarily of a smaller group of standards important to rapid deployment of sufficiently mature ITS technologies.

Given limitations of both resources and time, the committee is unprepared to specify what standards should be on this smaller list. However, **the committee recommends that each standard include a well-articulated concept of operations and clearly stated requirements that are met by the standard, reflecting that concept of operations.**

For those standards that are deployed, the committee reiterates its recommendation from previous reports, that federally funded support be provided for maintenance of ITS standards to ensure that the standards do not become prematurely obsolete as ITS technology and other federal programs evolve. This support should encompass the continued participation of public agency representatives in the standards maintenance effort.

The committee recognizes that federal resources for ITS standards are limited. Encouraging widespread use of standards that have not been demonstrated in successful field applications diverts resources from the activities needed to make the standards successful. **The committee recommends that JPO de-emphasize or defer the development of standards not critical to stated goals of federal ITS programs. Further, JPO should fund training and outreach efforts only for those standards that have been applied successfully in pilot or demonstration installations.** Taking this approach might make resources available for increased support of such activities as field testing and maintenance of standards.

The committee appreciates this opportunity to comment on the ITS Standards Program, and looks forward to continuing to work with DOT staff, consultants, and the professional community as a whole on this important program.

Yours truly,

Jonathan L. Gifford, Ph.D.
Chair, Committee for Review of the U. S. Department of Transportation's
Intelligent Transportation Systems (ITS) Standards Program (II)

Attachment 1: Committee Membership
Attachment 2: Meeting Agenda and Attendees

Attachment 1

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**Committee for
Review of US DOT's Intelligent Transportation Systems (ITS) Standards Program (II)**

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Members

Jonathan L. Gifford, Ph.D. (Chairman)
Department of Public & International Affairs
and the School of Public Policy
George Mason University
Arlington, VA

Jules A. Bellisio, Ph.D.
Telemediators, LLC
IEEE and Telcordia Fellow
Farmingdale, New Jersey

Ray Chamberlain, Ph.D.
Parsons Brinckerhoff
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Irwin Dorros, Dr. of Eng. Science
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Staff

Stephen R. Godwin
Transportation Research Board
Washington, DC

Andrew C. Lemer, Ph.D.
The Matrix Group, LLC
Baltimore, MD

Attachment 2

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**Committee for
Review of US DOT's Intelligent Transportation Systems (ITS) Standards Program (II)**

Meeting Agenda and Attendee

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Meeting of June 6-7, 2002

<u>Attendees</u>

Committee members	Sponsors and guests	TRB Staff
Jonathan Gifford, chair	Michael Schagrin (DOT/JPO)	Stephen Godwin
Ray Chamberlain	Bill Jones(DOT/JPO)	Andrew Lemer
Irwin Dorros	Gary Carver (JPL, Wed. only)	Amelia Mathis
William Johnson	Alan Stern (JPL)	Jocelyn Sands
Alexander Lopez	Anne Tsang (JPL, Wed. only)	
James Robinson	Lee Armstrong (Lee Armstrong	
Steve Shladover	Assoc.)	
Scott Stewart	Broady Cash (Arinc)	
William Spreitzer	Jules Madey (NY Thruway	
Phil Tarnoff	Authority)	
	Paul Najarian (ITSAmerica Wed. only)	

<u>Agenda</u>

Thursday, June 6   <u>10:00 am - 11:30 am: Closed session</u>

10:00 – 11:30	Opening statements
	- Welcome
	- Review of meeting objectives, issues from previous meetings, and issues raised by committee members
	- Anticipated future committee activities
11:30	Break, sponsors and guests join group

<u>11:30 - 5:30 pm: Open session</u>

11:30 - 12:00	Introductory remarks and introduction of guests
12:00 - 12:30	Lunch will be available in the meeting room
12:30 - 5:30	Discussion of "DOT's role in achieving widespread

adoption of common standards for ITS infrastructure" with particular regard for "dedicated short-range communications" (DSRC)—statements or presentations by DOT staff and other guests, followed by open discussion

Friday, June 7   <u>8:30 - 11:30 am Open session</u>

8:30 - 8:45   Review of previous day's discussion

9:00 - 12:00   Discussions of standards maintenance and update issues, and topics arising from previous day

12:00 - 12:30   Summary of key points from meeting discussions

<u>11:30 am - 2:30 pm: Closed session</u>

11:30 - 12:30   Committee members propose key points, findings conclusions, recommendations

12:30 - 2:00   Conclusions and recommendations, future reports, meeting schedules

2:30   Adjournment