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Traffic21/T-SET Progress Reports 10/1/15 - 9/30/2016

Please see requirements at: http://www.rita.dot.gov/utc/about/html/grant_deliverables_june_2014.html

This form is due October 15th, 2016. It is recommended to complete offline first, then enter your responses.

Please use "Nothing to Report" if there is nothing significant to report.

* Required

Project Name *

Sharing Costs of Vehicle

University Association *

CMU

Project PI's - REQUIRED *

Jon Peha

Co-PI *

none

Number of Students Funded - REQUIRED *

Please enter the number of students funded for this project by this source

- (●) 1
- ( ) 2
- ( ) 3
- ( ) 4
- ( ) 5 or more

Funded Students Names - REQUIRED *

Input multiple if necessary

Alexandre Ligo

Funded Student email - REQUIRED *

Input multiple if needed.

aligo@andrew.cmu.edu

Funded Student Program of Student and Exp Grad Date - REQUIRED *

Ph.D. in Engineering and Public Policy. Graduation date to be determined, tentatively December 2017

Deployment Partners/Participating Organizations - REQUIRED *

Provide the following information for each partnership: Organization Name: Location of Organization: (if foreign location list country) Partner's contribution to the project (identify one or more) Financial support; In-kind support (e.g., partner makes software, computers, equipment, etc., available to project staff); Facilities (e.g., project staff use the partner's facilities for project activities); Collaborative research (e.g., partner's staff work with project staff on the project); and Personnel exchanges (e.g., project staff and/or partner's staff use each other's facilities, work at each other's site).

The vehicular network trial we use in our research is operating in the City of Porto. The University of Porto has shared data with us. The Ph.D. student working on this project has spent time in Porto, and the University of Porto has provided him office space when he is there.

Other Collaborators *

If there is nothing significant to report during this reporting period, state “Nothing to Report.” Some significant collaborators or contacts within the lead or partner universities may not be covered by “What people have worked on the project?” Likewise, some significant collaborators or contacts outside the UTC may not be covered under “What other organizations have been involved as partners?” For example, describe any significant: Collaborations with others within the lead or partner universities; especially interdepartmental or interdisciplinary collaborations; Collaborations or contact with others outside the UTC; and Collaborations or contacts with others outside the United States or with an international organization. Country(ies) of collaborations or contacts.

Nothing to report

Journal Publications *

List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Include any peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like. A publication in the proceedings of a one-time conference, not part of a series, should be reported under “Books or other non-periodical, one-time publications.” Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Alexandre Ligo, Jon M. Peha and Joao Barros, "Throughput and Cost-Effectiveness of Vehicular Mesh Networks for Internet Access,"" Proceedings of IEEE 84th Vehicular Technology Conference (VTC), Montreal, Canada, September 2016.
Acknowledged federal support.

Books or other non-periodical, one-time publications *

Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like. Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

None

Other publications, conference papers and presentations *

dentify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above.

Alexandre Ligo and Jon M. Peha, "Cost-Effectiveness of Using Connected Vehicle Infrastructure for Internet Access," 2016 MASITE-ITSPA Annual Conference, State College, PA, August 2016.
Acknowledged federal support.

Other Dissemination Activities *

Made a presentation to leadership at the U.S. Federal Communications Commission (FCC) on this research, and its implications for FCC regulations on spectrum for Intelligent Transportation Systems.

Website *

https://users.ece.cmu.e

Technologies / Techniques - REQUIRED *

Identify technologies or techniques that have resulted from the research activities. Describe the technologies or techniques and how they are being shared.

None

Invention / Patent applications / Licenses *

Identify inventions, patent applications with date, and/or licenses that have resulted from the research. Submission of this information as part of an interim research performance progress report is not a substitute for any other invention reporting required under the terms and conditions of an award; as of the date of this document, UTC Program inventions may not be submitted to the Federal government's Interagency Edison (iEdison) invention-reporting system, but OST-R is working to make that available and will notify UTCs. For additional requirements pertaining to Patents and Copyrights, refer to General Provisions of Grants for University Transportation Centers, Section III, 14.

None

Other Products associated *

Identify any other significant products that were developed under this program. Describe the product and how it is being shared. Examples of other products are: Databases; Physical collections; Audio or video products; Software or NetWare Models; Educational aids or curricula; Instruments or equipment; Data & Research Material; Other

None

Please explain *

N/A

Impact - REQUIRED *

What is the impact of the program? How has it contributed to transportation education, research and technology transfer? Over the years, this base of knowledge, techniques, people, and infrastructure is drawn upon again and again for application to commercial technology and the economy, to health and safety, to cost-efficient environmental protection, to the solution of social problems, to numerous other aspects of the public welfare, and to other fields of endeavor. The taxpaying public and its representatives deserve a periodic assessment to show them how the investments they make benefit the nation. Through this reporting format, and especially this section, UTCs provide that assessment and make the case for Federal funding of research and education. DOT uses this information to assess how the research and education programs: increase the body of knowledge and techniques; enlarge the pool of people trained to develop that knowledge and techniques or put it to use; and, improve the physical, institutional, and information resources that enable those people to get their training and perform their functions.

This program has contributed to transportation research by showing that DSRC-based connected vehicle mesh networks can be cost-effective as dual-use technology, i.e. they can support both safety applications and provide Internet access in a way that is more cost-effective than cellular networks. In particular, our results show that these vehicular networks will be more cost-effective than cellular networks just a few years after deployment in densely populated cities like Chicago, Boston, New York and San Francisco. In the years that follow, they will become

Impact in other disciplines *

Describe how the findings, results, or techniques developed or improved, or other products from the program made an impact or are likely to make an impact on other disciplines.

Because this research is on connected vehicles, it has impact on both transportation and telecommunications. The impact on telecommunications is both technical and economic. First, as described above, our results show that connected vehicles offer a new way to provide mobile Internet access, and that this approach will soon be more cost-effective than today's approach in urban areas. Second, our results show that connected vehicles scale well, which has been an open research question. In particular, even when the number of

Impact on Technology Transfer *

Transfer of results to entities in government or industry; Instances where the research has led to the initiation of a start-up company; or Adoption of new practices.

We have presented results to the U.S. Federal Communications Commission (FCC), and offered advice to them on connected vehicles. The FCC has important decisions to make regarding spectrum used for Intelligent Transportation Services, and technical standards for devices that operate in this spectrum band.

Task List REQUIRED if planning to continue *

Our current task is to examine the potential benefits from connected vehicles infrastructure sharing, whereby government agencies who need roadside infrastructure to enhance safety and Internet service providers who need roadside infrastructure to serve as Internet gateways can partially share through some form of partnership. We will examine whether and where this approach would be an effective way for government agencies to cover a significant portion of the cost of safety infrastructure, as well as the broader impact on social welfare. In this task,

Goals & Timelines REQUIRED if planning to continue *

Our current funding runs out in a few months. In that time, we hope to produce one paper that can be submitted to a peer-reviewed conference or journal.

If we receive more funding, we will consider the impact of competing ISPs, which will require substantial changes to our network simulation model.

ANNUAL INDICATORS for period 10/1/2015 - 9/30/16

Number of GRADUATE transportation-related courses offered during the reporting period that were taught by faculty and/or teaching assistants who are associated with the project *

- (●) 1
- ( ) 2
- ( ) 3
- ( ) 4
- ( ) NONE
- ( ) Other:

Number of UNDERGRADUATE transportation-related courses offered during the reporting period that were taught by faculty and/or teaching assistants who are associated with the project *

- (●) 1
- ( ) 2
- ( ) 3
- ( ) 4
- ( ) NONE

Number of GRADUATE students participating in transportation research projects during the reporting period funded by this grant *

- (●) 1
- ( ) 2
- ( ) 3
- ( ) 4
- ( ) 5 or more
- ( ) NONE

Number of UNDERGRADUATE students participating in transportation research projects during the reporting period funded by this grant *

- ( ) 1
- ( ) 2
- ( ) 3
- ( ) 4
- ( ) 5 or more
- (●) NONE

Number of DOCTORAL students supported by this grant who received degrees during the reporting period *

- ( ) 1
- ( ) 2

- ○ 3
- ○ 4 or more
- ◉ NONE

Number of GRADUATE students supported by this grant who received degrees during the reporting period *

- ○ 1
- ○ 2
- ○ 3
- ○ 4 or more
- ◉ NONE

Number of UNDERGRADUATE students supported by this grant who received degrees during the reporting period *

- ○ 1
- ○ 2
- ○ 3
- ○ 4 or more
- ◉ NONE

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