IntelliDrive℠ System User Needs Workshop Read Ahead Material

IntelliDrive – What is it?

IntelliDrive is a suite of technologies and applications that use wireless communications to provide connectivity:

- Between vehicles (of all types)
- Between vehicles and roadway infrastructure
- Between vehicles and wireless communication devices
- Between wireless communication devices and roadway infrastructure

IntelliDrive is intended to support a variety of data communications-based applications to provide safety, mobility, and environmental services to both mobile and non-mobile users.

Mobile users may include:
- Private individuals traveling in motor vehicles
- Public safety personnel traveling in public safety vehicles
- Commercial vehicle operators in commercial vehicles
- Pedestrians and bicyclists
- Transit vehicle riders in transit vehicles
- Transit vehicle operators in transit vehicles
- Traffic management personnel traveling in maintenance and construction vehicles

Non-mobile users may include:
- Traffic operations personnel
- Transit system operators
- Toll management authorities
- Value added service providers
- Rail system operators
- Fleet dispatchers
- Emergency management personnel

Safety and mobility services, while a continual focus of the program over the last several years, are not intended to be its limit. Services that provide environmental benefit are a new focus for IntelliDrive support. In addition commercial applications that enhance safety, provide mobility services and/or are environmentally-focused will also be supported.

IntelliDrive System Engineering (SE) Program

The USDOT started the IntelliDrive SE Program to revisit and update the IntelliDrive System concept of operations, requirements, functional architecture, and physical architecture, and to develop a revised baseline of documentation that defines the IntelliDrive System. The existing document set that presents the IntelliDrive concept, requirements, and architecture as well as findings and lessons learned from the Vehicle Infrastructure Integration (VII) Proof of Concept effort will be used as a starting point.

1 The IntelliDrive℠ Logo is a Service Mark of the U. S. Department of Transportation
Transitioning from Previous and Current Systems

Legacy Intelligent Transportation Systems (ITS) that provide transportation related services are the starting point for the IntelliDrive System. Some of these systems could benefit from capabilities offered by IntelliDrive. In addition to these legacy systems, there has been research over the last 7 years specific to VII so that to some extent the VII system concept represents a “first draft” of the future concepts. While the VII proof of concept (POC) demonstrated the viability of the approach, some of the underlying assumptions that drove the VII architecture have since changed. As a result, this program is reevaluating the potential capabilities of IntelliDrive to capture and document the system interactions.

IntelliDrive SE Program – Assumptions, Constraints, and Stakeholder Input

Based on findings from the IntelliDrive work done thus far, there are several new assumptions, constraints, and new stakeholder input that will be applied to development of the revised system baseline.

These include the following new assumptions and constraints:

- **Wireless Technologies such as Wi-Fi and Cellular Communications may supplement DSRC at 5.9 GHz**: At the time of the VII initiative’s onset, the Federal Communications Commission (FCC) allocated 75 Megahertz of spectrum in the 5.9 Gigahertz (GHz) frequency band to be used for ITS wireless communications. This enabled the development of Dedicated Short Range Communication (DSRC) standards. The IntelliDrive SE Program will investigate other means of wireless communication between mobile and fixed elements, while still maintaining DSRC for Safety capabilities.

- **Aftermarket and Retrofit Devices – both on-board and handheld - to be considered**: Originally, the focus for On-board mobile units was on embedded systems installed by Original Equipment (vehicle) Manufacturers (OEMs) in new vehicles. The IntelliDrive SE Program will investigate the implications of including mobile units from industry suppliers as “retrofit” devices (integrated systems added post vehicle production), units developed and provided by companies as “aftermarket” devices (i.e., not necessarily integrated into vehicle systems), and “carry-in” units with in-vehicle mounts. In addition, handheld devices carried by pedestrians or bicyclists will be considered.

- **Reassessment of Deployment Strategy**: Given the current economic and political environment, rather than a nationwide IntelliDrive network rapid roll-out over a short timeframe, it appears more likely that deployment of IntelliDrive capability could occur on a regional and evolutionary basis, with regional IntelliDrive networks, using interoperable standards to ensure that the core services of IntelliDrive are the same no matter where the networks are established around the country.
• **Consideration of Various Vehicle Types:** The primary focus of work to date has been on the interaction between automobiles (those classified by manufacturers as “light vehicles”) and roadside infrastructure. The updated architecture should account for other vehicle types, including – but not limited to – transit, public safety, commercial vehicles, and rail.

• **Reconsideration of Approaches to Privacy and Anonymity:** All implementation approaches must be able to satisfy the privacy principles and provide anonymity for drivers and passengers in vehicles using IntelliDrive. These new technical approaches should adhere to the IntelliDrive privacy framework and ensure the trustworthiness of communications occurring between vehicles and between the vehicle and the infrastructure.

• **Reevaluation of Functions and Services:** The previous VII concept assumed a certain group of functions and services that would be provided by the system, at the national level. These will be revisited as part of the IntelliDrive SE program.

The IntelliDrive SE program will include discussions with a variety of stakeholder groups to consider further uses of the IntelliDrive system and to validate past input. Some of these groups include:

- Traffic system operators
- Transit and rail communities
- Commercial vehicle operations
- Tolling agencies
- Aftermarket broadcast device vendors
- Aftermarket auto-maker/retrofit device vendors
- Aftermarket & Carry-in Device Vendors
- Backhaul, Data Aggregators, and Network providers

### IntelliDrive – What is its Scope?

Consider the figure at left which shows IntelliDrive as the large circle. IntelliDrive can be viewed as consisting of: (1) Applications, which bring about safer, smarter, and greener transportation, and (2) a Core System, which enables applications through the cooperative interaction of vehicles (with one another) and cooperative interaction of vehicles with roadside equipment. IntelliDrive may be further divided into Mobile and Fixed (non-mobile) communications endpoints. Mobile endpoints are not typically connected to any wired network during normal operation, whereas fixed endpoints could be connected.

Consider also the different stakeholders, each with its own interests, including both public sector agencies and private industry.

### User Needs Workshops – What is the Goal?

The first step in developing a revised Concept of Operations is to identify user needs. This is where you come in. Over the course of several workshops, including large mixed groups of stakeholders from across the nation, the IntelliDrive SE team will elicit stakeholder input and develop a list of categorized user needs for the IntelliDrive
Core System. This may include validation of past user needs based on revised assumptions and constraints, and will likely include many new user needs that haven’t been considered yet.

**What is a User Need?**

So just what is a user need? For our purposes, a “User Need” is defined as a capability within the IntelliDrive System that either accomplishes a specific goal or solves a significant problem. It has the following characteristics:

- The User Need should describe “what” is needed, not “how” it should be implemented
- The User Need cannot be application specific
- The User Need should describe a capability
- The User Need should be scoped to the appropriate level. A User Need that is too general should be decomposed while a User Need that is too specific may imply design

When trying to identify User Needs for the IntelliDrive System, consider the capabilities, problems to be solved, and processes to be improved. This may include capabilities that IntelliDrive could support that would allow you to do something that cannot be done today.

**How Can You Help?**

The best thing you can do to help is to start thinking about user needs for your stakeholder group. If the IntelliDrive System were built . . .

- What would you do with it and what would you like it to do for you?
- What is the benefit? To whom does the benefit apply?
- How important is the benefit?

Come prepared with your ideas. Discuss these with your colleagues and consider the rationale for each capability that you believe should exist so that it can be discussed with others at the workshop. And of course, join in the discussion during the workshop. We want to hear from you.

**After the Workshop is Over, What Happens Next?**

The IntelliDrive SE Team will collect all of the stakeholder input. Some of the input will come in the form of capabilities or applications needing to be supported, which will be abstracted into user needs based on the discussion. The IntelliDrive SE Team will provide its Findings Report to the DOT who will disseminate it to the workshop participants.
A Final Word

We thank you in advance for participating in an IntelliDrive User Needs workshop. We hope you will find the discussion informative and we look forward to understanding how IntelliDrive can best serve the needs of all of the stakeholder communities.

Would you like to read more?

Many documents were developed to support the IntelliDrive program, including lessons learned and findings from the Proof of Concept.

The following is the link to the USDOT’s IntelliDrive website where you will find documents that may be particularly helpful to review prior to the workshop: http://www.its.dot.gov/intellidrive/index.htm

The Systems Engineering Guidebook for ITS (http://www.fhwa.dot.gov/cadiv/segb/) is intended to be a guide to applying systems engineering practices and principles to the acquisition of Intelligent Transportation Systems and oversight in ITS developments. It describes the process being used for this IntelliDrive System Engineering program, including the current collection of User Needs to support the development of the Concept of Operations.