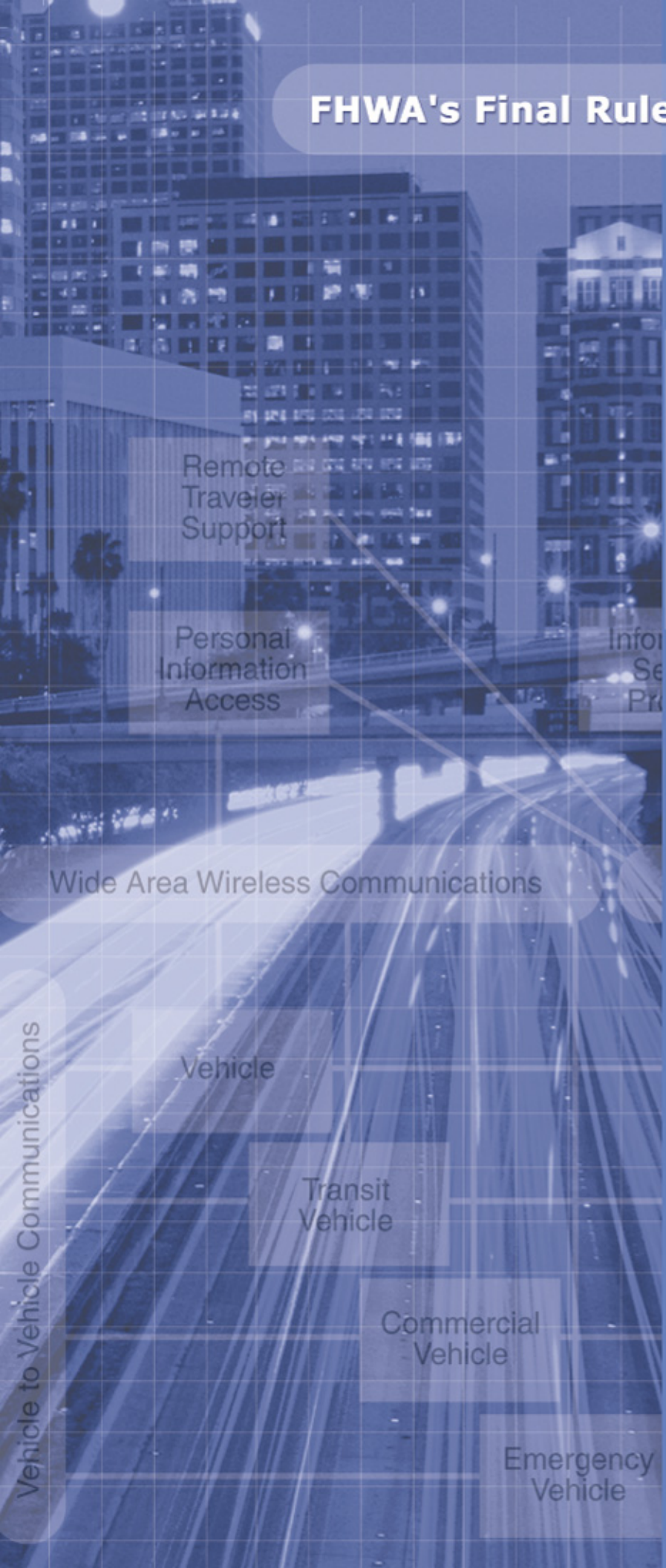
FHWA's Final Rule and FTA's Policy

for Applying the National ITS Architecture at the Regional Level



U.S. Department of Transportation

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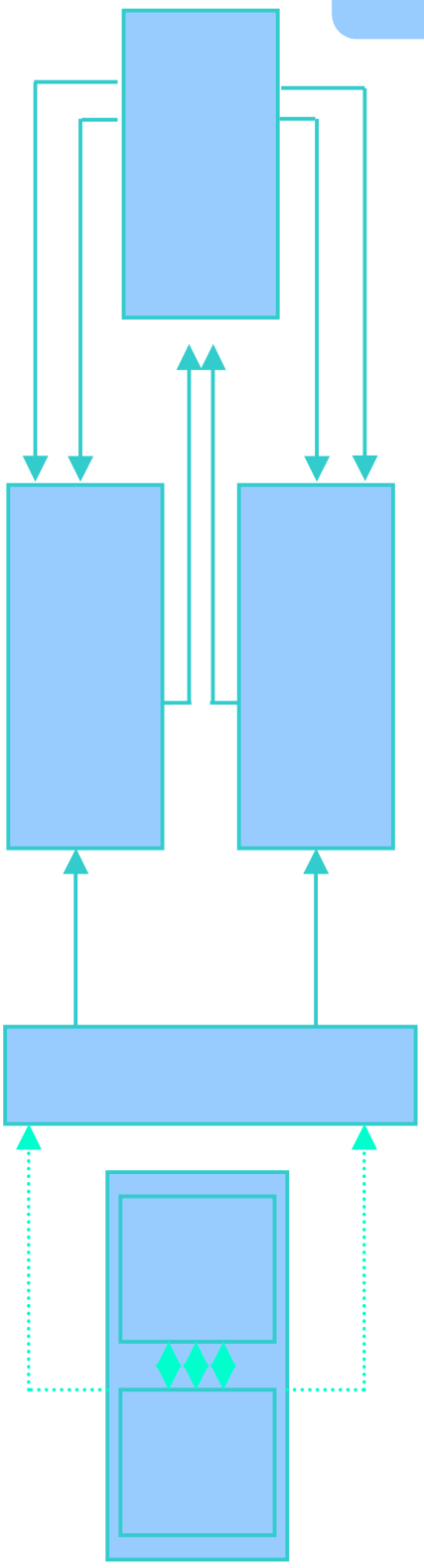


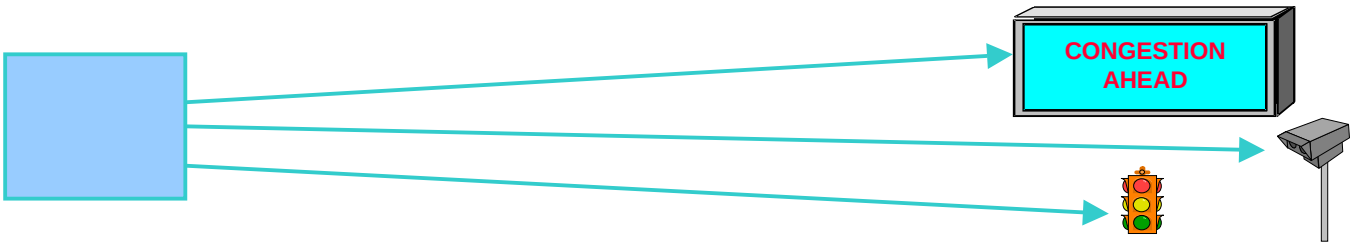
On January 8, 2001, the U.S. Department of Transportation published two important and related documents in the Federal Register:

- The Federal Highway Administration's **Final Rule** on the National ITS Architecture
- The Federal Transit Administration's **Policy** on the National ITS Architecture.**

(**These documents are similar in nature and both became effective on April 8, 2001. Their differences reflect the processes by which FHWA and FTA administer projects.)

The intention of the new Rule and Policy (hereafter, Rule/Policy) is to foster integration of the deployment of regional ITS systems. Regional ITS architectures help guide the integration of ITS components. During the development of a regional ITS architecture, agencies that own and operate transportation systems must together consider current and future needs to ensure that today's processes and projects are compatible with future ITS projects.

"ITS components that operate together and as part of a system will enhance safety and mobility and reduce the possibility of costly incompatible systems in the future."
Former DOT Secretary Rodney Slater



PAMPHLET OVERVIEW

How does the final Rule/Policy affect the planning and operations of regional transportation systems? How does it affect transportation practitioners who are planning or implementing ITS systems? This pamphlet addresses these questions by presenting guidance and information on the following subjects:

A. The reason for the Rule/Policy.
B. The relationship of the National ITS Architecture to regional ITS architectures.
C. New requirements and the use of systems engineering.
D. The relationship of the regional ITS architecture to ITS standards.
E. Tools for the ITS practitioner — training and technical assistance.

A. REASON FOR THE RULE/POLICY

In 1997, Congress passed the Transportation Equity Act for the 21st Century (TEA-21) to address the need to begin to work toward regionally integrated transportation systems. With the application of ITS technologies, different transportation networks run by different agencies can begin to function cooperatively to achieve greater efficiency and safety.

The Rule/Policy implements section 5206(e) of TEA-21, which requires that all ITS projects funded from the Highway Trust Fund (which includes transit projects funded from the Mass Transit Account) be in conformance with the National ITS Architecture and appropriate standards.

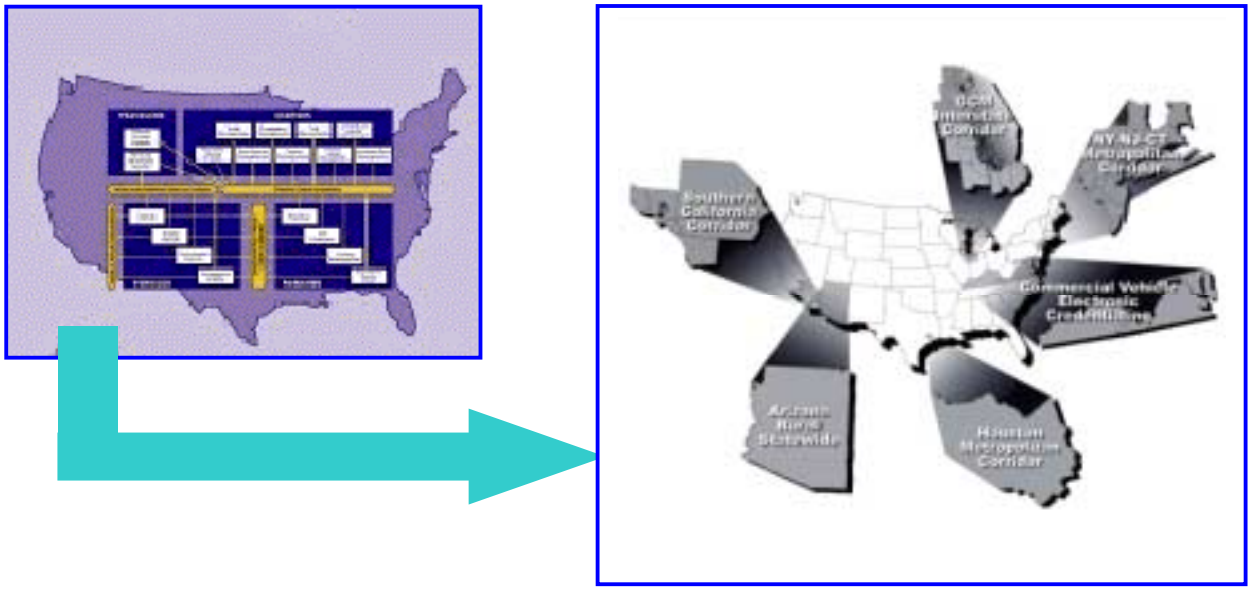
Copies of the complete text of the regulation can be found on the Internet on the Office of the Federal Register's web site at: **www.nara.gov/fedreg** and the Government Printing Office's web site at: **www.access. gpo.gov/nara**.

The document may also be viewed on the DOT's ITS website at: **www.its.dot.gov** and on the FTA's web site at: **www.fta.dot.gov**.

B. THE NATIONAL ITS ARCHITECTURE & REGIONAL ITS ARCHITECTURES

The National ITS Architecture is a useful tool to guide ITS practitioners in developing regional ITS architectures. It is a common framework that guides practitioners in establishing ITS interoperability and helps them choose the most appropriate strategies for processing transportation information. It defines the system components, key functions, organizations involved in developing an architecture, and the type of information to be shared between organizations and between parts of the system.

Because it is unlikely that the entire National ITS Architecture would be fully implemented by any single metropolitan area or state, the Rule/Policy requires that the National ITS Architecture be used to develop a local implementation, or a "**regional ITS architecture**." A regional ITS architecture is a local implementation, or subset, of the National ITS Architecture, developed with local requirements in mind.



A region is defined by local participants and is based on the needs for information sharing and coordination. It can be a metropolitan area, a state, a multi-State area, or a corridor.

The National ITS Architecture is maintained by the United States Department of Transportation (DOT) and is available on the DOT web site at **http://www.its.dot.gov**. As they become available, examples of regional ITS architectures will be posted on the web at **http://www.its.dot.gov/aconform/aconform.htm** to provide guidance. Currently, only a few regions have attempted to develop their own regional ITS architecture. ITS America hosts these examples at: **http://www.itsa.org/architecture.html**.

C. NEW REQUIREMENTS

The Rule/Policy states that if a region is already deploying ITS projects, then a regional ITS architecture must be developed within **four years** of the effective date or by **April 8, 2005.** If a region has not yet deployed an ITS project, then a regional ITS architecture must be developed within four years of the deployment of the initial ITS project in the region. Until a regional ITS architecture is in

place, the Rule/Policy requires that all major ITS projects have a project level architecture to ensure the proper consideration of regional integration. All ITS projects must follow the systems engineering process that is described on p. 5.

Major ITS Project:

Any ITS project that implements part of a regional ITS initiative that is *multi-jurisdictional, multi-modal,* or *otherwise affects regional integration of ITS systems.*

What happens if this deadline is not met? After April 8, 2005, no new ITS projects can advance without demonstrating compliance with a regional ITS architecture. So, if a region has not developed a regional ITS architecture, new ITS projects funded with Highway Trust Fund monies cannot advance until a regional ITS architecture has been developed.

What are the new requirements? The Rule/Policy states that if the architecture is to fulfill the objective of promoting ITS integration within a region, a regional ITS architecture must define how agencies, modes, and systems will interact and operate. At a minimum, the regional ITS architecture shall include the following (as stated in the Rule/Policy):

- A description of the region.
- Identification of participating agencies and other stakeholders.
- An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture.
- Any agreements (existing or new) required for operations including, at a minimum, those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture.
- System functional requirements.
- Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture).
- Identification of ITS standards supporting regional and national interoperability.
- The sequence of projects required for implementation.

It is important to note that the Final Rule/Policy does not require any changes or modifications to existing systems to conform to the National ITS Architecture. It is very likely, however, that a regional ITS architecture developed by local agencies and other stakeholders would call for the modification of legacy systems over time to support desired integration.

Using a Systems Engineering Perspective

The Rule/Policy also requires all ITS projects be developed using systems engineering. Systems engineering is an approach to designing projects that employs an iterative process in the design, testing, and evaluation of the implementation. A systems engineering approach requires the project team to consider all phases of a system's lifecycle from the moment of the system's conception to its installation. This means taking into consideration the stages of planning, design, procurement, deployment, operations, maintenance, expansion, and retirement of the system or subsystems. This approach also requires the team to:

- Identify alternatives at each step of building the system.
- Evaluate each alternative based on costs, political and technical considerations, and customer needs.
- Consider what risks exist throughout the process and plan for their management.

For ITS projects, the systems engineering analysis shall include, at a minimum (as stated in the Rule/Policy):

- Identification of portions of the regional ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the National ITS Architecture).
- Identification of participating agencies' roles and responsibilities.
- Requirements definitions.
- Analysis of alternative system configurations and technology options to meet requirements.
- Procurement options.
- Identification of applicable ITS standards and testing procedures.
- Procedures and resources necessary for operations and management of the system.

D. RELATIONSHIP OF THE REGIONAL ITS ARCHITECTURE TO ITS STANDARDS

The Rule/Policy requires that federally funded ITS projects use, where appropriate, U.S. DOT adopted ITS standards. If the National ITS Architecture defines a common framework for ITS integration, the ITS standards define how the system components operate within this framework. By specifying how systems and components interconnect, the standards allow for interoperability. To expedite deployment of nationally interoperable ITS systems and services, the U.S. DOT supports specific ITS standards initiatives, especially in areas that have significant public benefit.

The U.S. DOT ITS Standards Program is working toward the widespread use of standards to encourage the interoperability of ITS systems. Through cooperative agreements with five standards development organizations (SDOs), the Standards Program is accelerating development of non-proprietary, industry and consensus-based ITS standards, and is encouraging public-sector participation in the development process.

At this time, various SDO's are developing over 80 ITS standards. Many of these standards are in the testing phase, though some have been deployed in the real-world. As an SDO-approved standard matures and the market for a standard expands, the U.S. DOT may decide to adopt an ITS standard through a formal rulemaking process. Only after a rulemaking is completed will an ITS standard be required for use in federally funded ITS projects. To date, no standards have been adopted by the U.S. DOT.

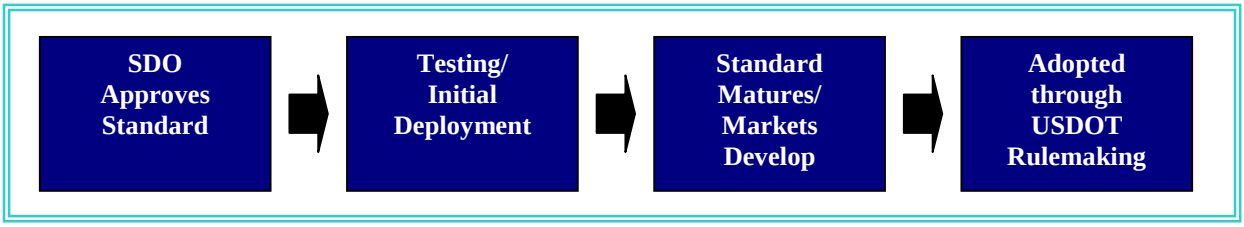
When is an ITS Standard Ready for U.S. DOT Adoption?

To begin, not every ITS standard will be considered for U.S. DOT adoption. Adoption will be most relevant for those standards that apply to systems that might be acquired using Highway Trust Fund dollars. For an ITS standard to be considered for adoption by the U.S. DOT, the standard must, at a minimum, meet the following criteria:

- The standard must be approved by an SDO.
- The standard has been successfully tested in real world applications as appropriate.
- The standard has received some degree of acceptance by the community served by the standard.
- Products exist to implement the standard.

- There is adequate documentation to support the use of the standard.
- There is training available in the use of the standard where applicable.

Meeting these criteria may take a standard one to three years from the time it is approved by an SDO. Once an ITS standard passes these criteria, a formal rulemaking process may be initiated by the U.S. DOT ITS Standards Program. The process offers the user community the opportunity for discussion and comment on the standard before it is required for use in federally funded ITS projects.



Encouraging the use of ITS standards

In the absence of adopted ITS standards, ITS practitioners are encouraged to use SDO-approved ITS standards when deploying ITS projects in their region. The use of ITS standards is necessary to provide integrated, fully open systems.

U.S. DOT will continue to encourage stakeholders to test developing standards, and where available, use ITS standards products in deployment. In support of early deployment, the ITS Standards Program offers a set of information and resources to those ITS project managers who decide to use ITS standards now. A new web site located at ***www.its-standards.net***, exists to provide background information, testing results, and guides to deploying specific standards. In addition, links to contacts, training, and technical assistance resources can also be found on this site.

Early deployers are frequently the first to try out ITS standards as part of the ITS deployment program within their area. Their role in the promotion of ITS standards is to be applauded, as the nation and their local communities benefit from the installation of open systems. Early deployers are helping to grow the market for ITS standards products. They are also reducing the risk of being locked into proprietary products that can only be maintained by a single vendor over the lifetime of the installation. They are installing systems that will lead to easier future expansion, compatibility, and interoperability.

E. TOOLS FOR THE ITS PRACTITIONER — OUTREACH, TRAINING, AND TECHNICAL ASSISTANCE

Questions about conformity with the final Rule/Policy abound, as ITS practitioners face the prospect of developing a regional ITS architecture and designing ITS systems based on ITS standards. To help navigate the maze of issues and needs, U.S. DOT will continue to provide ITS practitioners with the necessary guidance through information packets, outreach, training workshops and courses, and technical assistance. The ITS Joint Program Office has developed two separate programs, or tracks of training and technical assistance, to provide the targeted support ITS practitioners will need. They are an Architecture Development Track and a Standards Implementation Track

The Architecture Development Track

This track is designed to support the development of regional ITS architectures. Areas that would benefit most from this track are areas that are about to engage in the development of a regional architecture, or are already in the process of doing so and are looking for assistance assuring regional integration. Included in this track will be training, workshops, and technical assistance.

Training will consist of the following courses:

- ***ITS Architecture Standards and Conformity: FHWA Rule and FTA Policy****:* A ½ day, briefing session for State and local officials that is available through the field offices of FHWA and FTA.
- ***National ITS Architecture Course:*** A 2-day, interactive classroom course introducing the concepts, terms, and tools. This course is available through the National Highway Institute (**www.nhi.fhwa.dot.gov**).
- ***Introduction to Systems Engineering:*** An introductory course that will be offered through the classroom or on the web (check the ITS Professional Capacity Building web site for up-to-date information at **www.pcb.its.dot.gov**).
- ***Complying with the FTA's Policy on ITS Architecture Consistency and its Impact on Project Planning and Implementation****:* The purpose of this one-day course is to assist transportation agencies and Federal field staff with acquiring a working knowledge of FTA's policy on National ITS Architecture consistency. This includes an understanding of the policy, the intent behind the policy, the impact of transit ITS planning and development, practical benefits of

conformance, and guidelines for meeting policy requirements. The course is currently under development. For an updated status on the course, please visit our website **www.ntionline.com**, or contact Freddie C. Fuller at ffuller@nti.rutgers.edu.

- ***Turbo Architecture Course:*** A one day classroom course which provides an understanding of how to use the Turbo Architecture software to develop a regional ITS architecture. This course will be available in the Fall of 2001 from the National Highway Institute.

Workshops will include:

- ***Regional Architecture Process:*** A two-day workshop designed to prepare key players, champions, and their consultants for the process of developing a regional architecture. It will include presentations from experienced deployers. The workshops will be available in the Winter of 2001-02.

Technical Assistance will include:

- ***Direct Technical Assistance*** provided by FHWA and FTA field staff. Additional consultant support from U.S. DOT consultants, including the National ITS Architecture team and FTA consultant support, will be available.
- ***Peer Assistance*** through the Peer- to -Peer Program, general information and peer assistance related to architecture development.

The Standards Implementation Track

This track is designed to support and foster the implementation of SDO approved standards. This track would most benefit jurisdictions that will soon be procuring and implementing ITS elements for which ITS standards exists. As with the Architecture track, the standards implementation track includes training, workshops, and technical assistance.

Training will consists of the following courses:

- ***Standards Overview****:* A one day course to provide decision makers and transportation professionals with an overview of ITS standards. This course was developed by the Institute of Transportation Engineers (ITE) and can be scheduled through their web site at **www.ite.org**, or by contacting James Cheeks, Jr., ITE, 202-289-0222 x 131 or jcheeks@ite.org.

- ***NTCIP Overview Course (ITE):*** A course that gives transportation professionals engaged in ITS an overview of NTCIP. This course was developed by the Institute of Transportation Engineers (ITE) and can be scheduled through their web site at **www.ite.org**, or by contacting James Cheeks, Jr., ITE, 202-289-0222 x 131, or jcheeks@ite.org.
- ***Standards Application Courses:*** A series of courses that provide ITS project managers with specific training in the standards application areas of Dynamic Message Signs (DMS), Signals (ASC/ATC), Center-to-Center, and others as they are developed. These courses will have a mix of public and private sector interests. They are being developed by the Institute of Transportation Engineers (ITE) and can be scheduled through their web site at **www.ite.org,** or by contacting James Cheeks, Jr., ITE, 202-289-0222 x 131, or jcheeks@ite.org.
- ***Transit Standards Consortium Courses****:* Application courses will be provided by the Consortium to cover the areas of TCIP, procurement, vehicle area networks, and the challenges of migrating from legacy systems. For the most up-to-date information, visit the TSC web site at **www.tsconsortium.org.**

Workshops will include:

- ***Applications Workshop:*** As a follow up to the standards application courses, applications workshops will be offered in many of the same application areas (DMS, Center-to-Center/TMDD, ASC/ATC, etc.). Lessons learned, case studies, and actual exercises will be used throughout this workshop. The target audience is key project staff from State and local transportation agencies, and their consultants, that will be involved in an upcoming procurement of ITS components in the subject application area. The initial application workshop will focus on DMS and will be piloted late in the Summer of 2001.

Technical Assistance will be offered in the form of:

- ***Direct Technical Assistance*** will be provided by U.S. DOT ITS specialists and contracted expert assistance to those in the process of implementing ITS Standards.
- ***Peer Assistance*** through the Peer-to-Peer program will also be provided for general information and assistance.

OTHER RESOURCES: WEB SITES

- **www.its.dot.gov** is the U.S. DOT primary ITS Web site and contains information about the Peer-to-Peer training program and other training opportunities.
- **http://www.iteris.com/itsarch** is an interactive website that hosts the National ITS Architecture in electronic form. The site is designed to walk the user through the National ITS Architecture in the form that best meets the user's needs.
- **http://www.its.gov/aconform/aconform.htm**, referred to as the Conformity Website, contains an electronic binder of ITS information designed to provide the most current information about architecture and standards.
- **http://www.its-standards.net** contains useful information to help ITS practitioners decide to use ITS standards in their deployments.
- **http://www.ntcip.org/library** contains the NTCIP Implementation Guide.
- The ITS Professional Capacity Building Program (PCB Program) is responsible for developing training related to ITS, including the National ITS Architecture and ITS Standards. Courses are listed on the PCB Program website at: **www.pcb.its.dot.gov**.
- **www.citeconsortium.org** is the Consortium for ITS Training and Education's (CITE) web site. This web site presents a series of web-based courses in ITS. Importantly, the **Introduction to the National ITS Architecture** course is presented in partnership with the ITS Joint Program Office and can be accessed at this site address for **free** through the Summer of 2002. The course introduces the concepts of the National ITS Architecture and systems engineering.

FURTHER TECHNICAL ASSISTANCE

Despite a wealth of resources available at your fingertips, questions still arise that go beyond general information and training and require specific assistance. The first place to find technical assistance is at the FHWA Division Office or FTA Regional Office.

FHWA Division Offices	**www.fhwa.dot.gov/fieldoff.htm**
FTA Regional Offices	**www.fta.dot.gov/office/regional**

FHWA Resource Center ITS Specialists are also available to provide training and locate additional resources for the National ITS Architecture and ITS standards.

Eastern Resource Center	**www.fhwa.dot.gov/resourcecenters/eastern/index.htm**
Midwestern Resource Center	**http://mrc.fhwa.dot.gov/**
Southern Resource Center	**www.fhwa.dot.gov/resourcecenters/southern/index.htm**
Western Resource Center	**www.fhwa.dot.gov/resourcecenters/western/index.htm**

Second, the **Peer-to-Peer Program** is set up to put people in touch with peers who have already been through the process and to provide limited technical assistance. They can be reached at:

- Phone at: (888) 700-PEER
- Facsimile at: 410-424-2300
- Email at: dotpeer@erols.com
- The web at: **www.its.dot.gov/peer/peer.htm.**

CONCLUSION

The U.S. DOT is committed to helping ITS practitioners understand the need for the new Rule/Policy, and to provide support for regional teams to meet their obligations. The following U.S. DOT contacts can provide more information on policies and programs related to the National ITS Architecture and ITS standards. Comments on how to improve our support programs are welcomed.

U.S. DOT Architecture and Standards Conformity Contacts

Ron Boenau	**FTA Policy**	202-366-0195	**ron.boenau@fta.dot.gov**
Mike Freitas	**ITS Architecture Conformity**	202-366-9292	**michael.freitas@fhwa.dot.gov**
Mark Kehrli	**Training and Technical Assistance**	202-366-5465	**mark.kehrli@fhwa.dot.gov**
Bob Rupert	**FHWA Rule**	202-366-2194	**robert.rupert@fhwa.dot.gov**
Mike Schagrin	**ITS Standards**	202-366-2180	**mike.schagrin@fhwa.dot.gov**

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