

DEPLOYING THE INTEGRATED METROPOLITAN INTELLIGENT TRANSPORTATION SYSTEMS (ITS) INFRASTRUCTURE

FY 2003 REPORT

Summary

In January 1996, the Secretary of Transportation set a goal of deploying the integrated metropolitan Intelligent Transportation System (ITS) infrastructure in 75¹ of the nation's largest metropolitan areas by 2005. Using data from surveys administered to transportation agencies in major metropolitan areas since 1997, the ITS Joint Program Office rates each area as having achieved High, Medium, or Low integrated ITS deployment. The Secretary's goal will be achieved when all of the 75 metropolitan areas are rated either High or Medium. The 2003 intermediate goal was achieved. Four metropolitan areas advanced to medium for integrated deployment in 2003 for a total of 61. The interim goal for 2004 is 68, requiring seven metropolitan areas to advance.

Purpose

In January 1996, the Secretary of Transportation set a goal of deploying the integrated metropolitan Intelligent Transportation System (ITS) infrastructure in 75 of the nation's largest metropolitan areas by 2005:

"I'm setting a national goal: to build an intelligent transportation infrastructure across the United States to save time and lives, and improve the quality of life for Americans. I believe that what we do, we must measure . . . Let us set a very tangible target that will focus our attention . . . I want 75 of our largest metropolitan areas outfitted with a complete intelligent transportation infrastructure in 10 years."²

This paper reports the 2003 status of integrated deployment in these 75 sites and presents an estimate of progress toward fulfillment of the Secretary's goal.

Measuring Deployment - The Deployment Tracking Methodology

Traditionally, the product of a transportation infrastructure investment consists of a fixed asset such as a highway, bridge, or public transportation vehicle developed, constructed, or purchased by a single agency. Tracking the level of deployment for such fixed assets

¹ Since the Secretary of Transportation's speech, the number of metropolitan areas that DOT will measure has been increased from 75 to 78. However, to maintain reporting consistency across the 10-year goal period, this report considers only the original 75 metropolitan areas.

² Excerpt of a speech delivered by the Secretary of Transportation at the Transportation Research Board in Washington, DC on January 10, 1996.

can be accomplished by simply counting the number deployed. Measuring the deployment of the metropolitan ITS infrastructure is more complex because it consists of a set of systems, often deployed by multiple agencies, and integrated through a combination of complex institutional and technical arrangements. To track progress, it is not sufficient to simply count the number of systems deployed without first devising a measurement approach that captures the essential features of such systems in a consistent fashion across many deployment environments.

In order to track progress toward fulfillment of the Secretary's goal for integrated deployment, the U.S. Department of Transportation ITS Joint Program Office developed the metropolitan ITS deployment tracking methodology. This methodology tracks deployment of the nine components that make up the ITS infrastructure: Freeway Management; Incident Management; Arterial Management; Emergency Management; Transit Management; Electronic Toll Collection; Electronic Fare Payment; Highway-Rail Intersections; and Regional Multimodal Traveler Information. Through a set of indicators tied to the major functions of each component, the level of deployment is tracked for the 75 largest metropolitan areas. In addition, the integration links between agencies operating the infrastructure are also tracked. The details of the methodology are explained elsewhere.³

Setting and Measuring Goals Using Deployment Tracking Data

The Secretary's goal calls for the deployment of a "complete intelligent transportation infrastructure" in each metropolitan area. Ideally, each metropolitan area would have a locally defined set of deployment goals that constitute a "complete" deployment for the area. These locally defined deployment goals could then provide the basis for assessing how close an area is to "complete" deployment as envisioned by the Secretary's goal in a "bottom-up" fashion.

A comprehensive set of locally defined deployment goals is not currently available. Therefore, it was necessary to develop a methodology to determine the level of deployment for an area based on a "top-down" approach. A set of deployment threshold values were identified and applied across all metropolitan areas in order to categorize each metropolitan area into one of three levels of deployment: High, Medium, or Low. These threshold values were established in a way that allowed demarcation of meaningful progress toward an achievable 10-year goal. Similar thresholds were developed for rating integration.

The assignment of a single integrated deployment rating for each metropolitan area was accomplished using a three-step process. First, the current level of deployment of the ITS infrastructure components at each metropolitan area was determined. These data were compared to an established threshold level for each component to determine a deployment rating. Next, an integration rating was assigned to each area based on the degree to which its infrastructure components are integrated. Finally, the resulting

³ U.S. DOT(1999). "Measuring ITS Deployment and Integration.
http://www.itsdocs.fhwa.dot.gov/repts_te/3dg01!.pdf, EDL#4372."

ratings for deployment and integration were combined into a single overall integrated deployment rating.

Crossing a threshold value for either deployment or integration means that a metropolitan area has made a significant commitment to deploy and integrate the metropolitan ITS infrastructure. However, it does not mean that deployment or integration is complete. Figure 1 shows that, even in the High level of deployment, a metropolitan area may still have "miles to go" in completing full deployment. A significant level of investment of time and money is needed to organize and perform initial planning for metropolitan areas categorized as Low, in order to build deployment momentum. Metropolitan areas in the Medium stage are moving rapidly toward full deployment through leveraging the important initial investments in ITS infrastructure. Metropolitan areas in the High category are beginning to experience still higher rates of return on investment in ITS; however, these metropolitan areas still need continued investment to bring them up to complete deployment. In these High rated metropolitan areas, new systems are being added to an already robust infrastructure, and integration is multiplying the impact of deployments, producing more "bang for the buck." All this adds up to a solid and expanding base for deploying the integrated infrastructure, but only with a sustained commitment of time and resources.

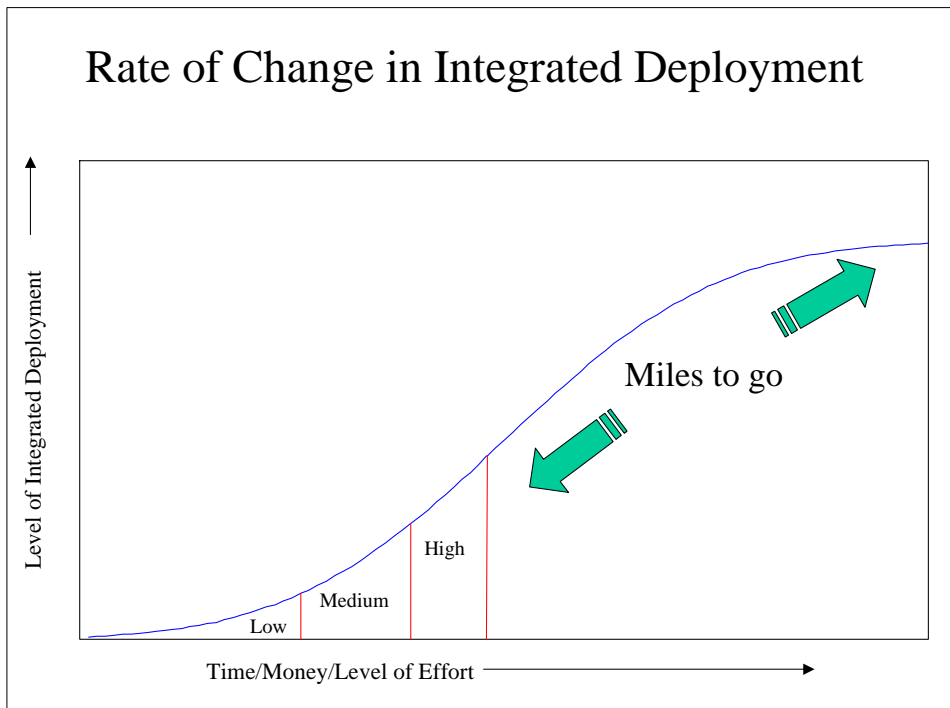


Figure 1. Rate of change in Integrated Deployment

Measuring the Level of Component Deployment

The process for determining the level of infrastructure deployment in a metropolitan area makes use of the indicators and threshold values contained in Table 1. A metropolitan area is rated High in component deployment if it exceeds the threshold value for at least one of the indicators in each of the five components. A metropolitan area is rated Medium in component deployment if it exceeds the threshold value for Freeway Management/Incident Management or Transit Management/Electronic Fare Payment and at least one other component. A metropolitan area is rated Low in component deployment if it exceeds the threshold value for one or fewer components.

Table 1
Component Indicators and Threshold Values Used to Measure the Presence of ITS
Component Deployment

ITS Components	Component Indicators	Threshold Values
Freeway Management/Incident Management	% freeway miles under electronic surveillance; % freeway miles with Freeway Service Patrols; % freeway miles with CCTV	Greater than or equal to 20%
Transit Management/Electronic Fare Payment	% buses equipped with AVL; % buses equipped with electronic fare payment	Greater than or equal to 33%
Arterial Management	% signalized intersections under computerized control	Greater than or equal to 33%
Regional Multimodal Traveler Information	% geographic coverage of traveler information from freeway electronic surveillance and freeway CCTV cameras ⁴	Greater than or equal to 10%
Emergency Management Services	% emergency vehicles operating under CAD	Greater than or equal to 33%

Measuring the Level of Integration

The level of integration in a metropolitan area is measured using a defined set of links involving the three major organizations that operate the infrastructure: states, that manage Freeway Management and Incident Management components; local governments, that manage most of the Arterial Management components; and public transit authorities, that manage the Transit Management component. A link is considered present if any integration indicator connecting agencies has a value greater than zero. These indicators

⁴ In 2003, the definition of coverage for traveler information was expanded to include the coverage of freeway CCTV where travelers have access to the CCTV images through the Internet or other means.

involve real-time operational coordination and include: sharing information with other agencies on traffic conditions or incidents by arterial or freeway agencies, provision for transit vehicles to obtain priority at arterial traffic signal or freeway ramp meters, and the use of transit vehicles as probes on arterials or freeways. An integration level of High is assigned to a metropolitan area if all three links are present. An integration level of Medium is assigned if any two out of three links are present. An integration level of Low is assigned if one or fewer links are present.

Measuring the Level of Integrated Deployment

The two High/Medium/Low classifications for both integration and component deployment are combined into a single High/Medium/Low category using the rules contained in Table 2.

**Table 2
Combined High/Medium/Low Classification Scheme**

Component Classification	Integration Classification	Combined Classification
High	High	High
High	Medium	Medium
High	Low	Medium
Medium	High	High
Medium	Medium	Medium
Medium	Low	Low
Low	High	Medium
Low	Medium	Medium
Low	Low	Low

2003 Status of Integrated Deployment

In order to obtain the data needed to support this methodology, transportation agencies in the 75 metropolitan areas being tracked were surveyed concerning deployment and integration. Data were gathered in separate national survey efforts conducted in four years: 1997, 1999, 2000, and 2002. There was no national survey in 1998, 2001, and 2003. To track goal progress in the years without a national survey, a limited telephone survey was conducted in 2001, and repeated in 2003. These telephone surveys were limited to agencies in the metropolitan areas that had received a rating of Low for integrated deployment. The results of these data gathering efforts are shown in Figure 2.

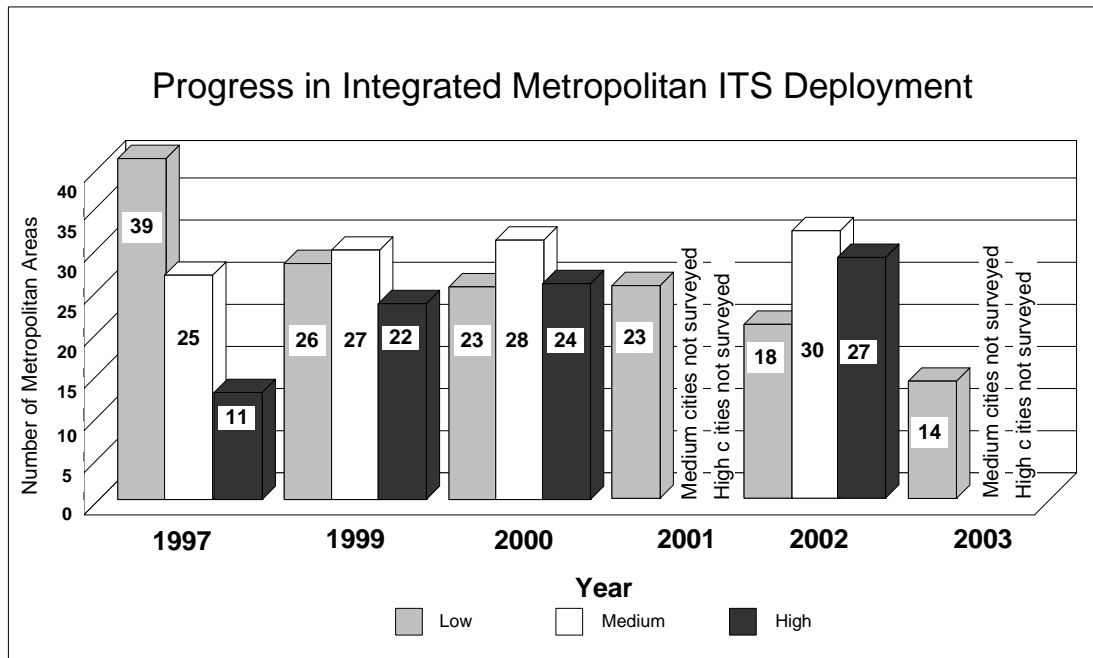


Figure 2. Progress in Integrated Metropolitan ITS Deployment

Figure 2 shows that in 2003, four metropolitan areas advanced from an overall Low rating. A total of 14 metropolitan areas are categorized as Low with 61 areas rated Medium or High. This can be contrasted with the 1997 deployment baseline in which 39 areas were characterized as Low, 25 as Medium, and 11 as High.

Table 3 lists the 75 metropolitan areas and their respective level of integrated deployment for 1997, 1999, 2000, 2001, 2002, and 2003. As previously discussed, these ratings combine information concerning deployment and integration into a single overall measure. Areas with a High or Medium level of integrated deployment in 2003 are listed at the top of the table, followed by areas with a Low level of integrated deployment. The four metropolitan areas advancing to Medium are in bold.

**Table 3
Metropolitan Areas and Their Respective Level of Integrated Deployment**

Metropolitan Area	Integrated-Deployment Level					
	1997	1999	2000	2001*	2002	2003*
Atlanta, GA	High	High	High		High	
Albany, Schenectady, Troy, NY	Low	Med	Med		High	
Baltimore, MD	Med	High	High		High	
Buffalo, Niagara Falls, NY	Med	Med	Med		High	
Charlotte, Gastonia, NC; Rock Hill, SC	Med	High	High		High	
Chicago, Lake County, IL; Gary, IN	Med	High	High		High	
Cincinnati, Hamilton, OH	High	High	High		High	

Metropolitan Area	Integrated-Deployment Level					
	1997	1999	2000	2001*	2002	2003*
Dallas, Fort Worth, TX	Med	High	High		High	
Detroit, Ann Arbor, MI	Med	High	High		High	
Greensboro, Winston-Salem, High Point, NC	Low	High	High		High	
Houston, Galveston, Brazoria, TX	High	High	High		High	
Jacksonville, FL	Med	Med	High		High	
Los Angeles, Anaheim, Riverside, CA	High	High	High		High	
Miami, Fort Lauderdale, FL	Med	Med	High		High	
Milwaukee, Racine, WI	Med	High	High		High	
Minneapolis, St. Paul, MN	High	High	High		High	
New York, NY; Northern New Jersey, NJ; Southwestern Connecticut, CT	High	High	High		High	
Orlando, FL	Med	High	High		High	
Philadelphia, PA; Wilmington, DE; Trenton, NJ	Med	High	High		High	
Phoenix, AZ	High	High	High		High	
Portland, OR; Vancouver, WA	High	High	High		High	
Salt Lake City, Ogden, UT	Low	Med	Med		High	
San Antonio, TX	Med	High	High		High	
San Diego, CA	High	High	High		High	
San Francisco, Oakland, San Jose, CA	Med	High	High		High	
Seattle, Tacoma, WA	High	High	High		High	
Washington, DC	High	High	High		High	
Allentown, Bethlehem, Easton, PA	Med	Med	Med		Med	
Austin, TX	Med	Med	Med		Med	
Bakersfield, CA	Low	Low	Low	Low	Med	
Baton Rouge, LA	Low	Low	Med		Med	
Boston, Lawrence, Salem, MA	Med	Med	Med		Med	
Birmingham, AL	Low	Low	Med		Med	
Cleveland, Akron, Lorain, OH	Med	Med	Med		Med	
Denver, Boulder, CO	Med	Med	Med		Med	
El Paso, TX	Low	Low	Low	Low	Med	
Fresno, CA	Low	Low	Low	Low	Med	
Grand Rapids, MI	Low	Low	Low	Low	Med	
Hampton Roads, VA	Med	Med	Med		Med	
Harrisburg, Lebanon, Carlisle, PA	Low	Med	Med		Med	
Hartford, New Britain, Middletown, CT	Low	Med	Med		Med	
Kansas City, MO	Low	Low	Med		Med	
Memphis, TN	Med	Med	Med		Med	
New Haven, Meriden, CT	Med	Med	Med		Med	
New Orleans, LA	Low	Med	Med		Med	
Omaha, NB	Low	Low	Low	Low	Med	
Pittsburgh, Beaver Valley, PA	Med	Med	Med		Med	
Providence, Pawtucket, RI; Fall River, MA	Low	Med	Med		Med	

Metropolitan Area	Integrated-Deployment Level					
	1997	1999	2000	2001*	2002	2003*
Raleigh-Durham, NC	Med	Med	Med		Med	
Richmond, Petersburg, VA	Low	Med	Med		Med	
Rochester, NY	Med	Med	Med		Med	
Sacramento, CA	Med	Med	Med		Med	
Scranton, Wilkes-Barre, PA	Low	Med	Med		Med	
St. Louis, MO	Low	Med	Med		Med	
Tampa, St. Petersburg, Clearwater, FL	Low	Med	Med		Med	
Tucson, AZ	Low	Med	Med		Med	
West Palm Beach, Boca Raton, Delray, FL	Low	Med	Med		Med	
Charleston, SC	Low	Low	Low	Low	Low	Med
Columbus, OH	Low	Low	Low	Low	Low	Med
Nashville, TN	Low	Low	Low	Low	Low	Med
Greenville, Spartanburg, SC	Low	Low	Low	Low	Low	Med
Dayton, Springfield, OH	Low	Low	Low	Low	Low	Low
Honolulu, HI	Low	Low	Low	Low	Low	Low
Indianapolis, IN	Low	Low	Low	Low	Low	Low
Knoxville, TN	Low	Low	Low	Low	Low	Low
Las Vegas, NV	Low	Low	Low	Low	Low	Low
Little Rock, North Little Rock, AR	Low	Low	Low	Low	Low	Low
Louisville, KY	Low	Low	Low	Low	Low	Low
Oklahoma City, OK	Low	Low	Low	Low	Low	Low
Springfield, MA	Low	Low	Low	Low	Low	Low
Syracuse, NY	Low	Low	Low	Low	Low	Low
Toledo, OH	Low	Low	Low	Low	Low	Low
Tulsa, OK	Low	Low	Low	Low	Low	Low
Wichita, KS	Low	Low	Low	Low	Low	Low
Youngstown, Warren, OH	Low	Low	Low	Low	Low	Low

* 2001 and 2003 ratings are based on a telephone survey of metropolitan areas rated Low in 2000 and 2002. Cities ranked Medium and High in 2000 and 2002 were not evaluated in 2001 and 2003 and were not assigned a ranking in those years.

Tracking Integrated Deployment Progress

The measurement of progress for 2003 can be set in the context of yearly goals leading to achievement of the Secretary's 2005 integrated deployment goal. Figure 3 compares the level of integrated deployment measured in 1997, 1999, 2000, 2001, 2002, and 2003 to goals for deployment for each year through 2005. No data were collected in 1998; therefore, only the goal levels of integrated deployment are shown for 1998. In 2003, four metropolitan areas advanced from Low to Medium. To meet the interim goal, the number of metropolitan areas rated Low needed to fall to 14 in 2003; which was achieved.

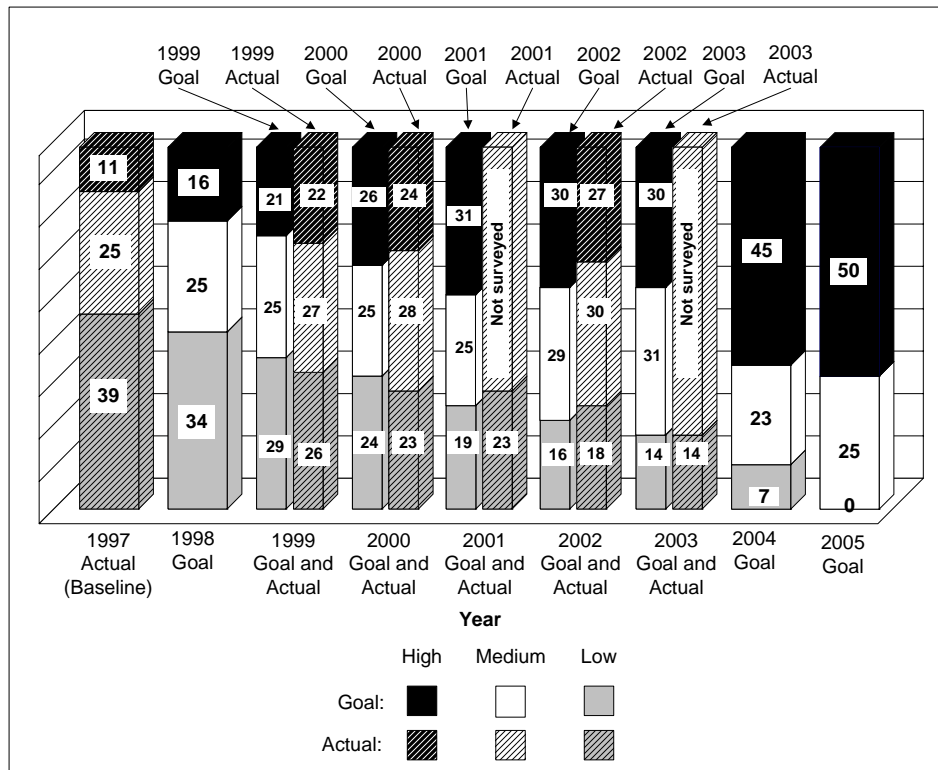


Figure 3. Deployment Goals and Actual Deployment Levels for 75 Metropolitan Areas

Summary and Conclusions

This paper documents progress toward fulfillment of the Secretary's goal of deploying a complete intelligent transportation infrastructure in 75 of the nation's largest metropolitan areas by 2005. The methodology for measuring this progress has been described along with the 2003 status of deployment. The methodology relies on a "top-down" approach to goal setting absent a set of "bottom-up" goals for each metropolitan area. The results indicate that, while a significant level of progress has been made, even among deployment leaders there are still "miles to go" before a complete infrastructure is deployed. The 2003 results indicate that the yearly goal for having metropolitan areas in the Medium or High rating was achieved. The next complete survey of all metropolitan areas will occur in 2004.