Tracking the Deployment of the Integrated Metropolitan Intelligent Transportation Systems Infrastructure in Spokane, WA

FY04 Results

June 2005

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Spokane, WA

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16. Abstract

This report describes the results of a major data gathering effort aimed at tracking deployment of nine infrastructure components of the metropolitan ITS infrastructure in Spokane. The nine components are: Freeway Management, Incident Management, Arterial Management, Electronic Toll Collection, Electronic Fare Payment, Transit Management, Highway-Rail Intersections, Emergency Management, and Regional Multimodal Traveler Information. Deployment is tracked through the use of indicators tied to the major functions of each component. In addition, integration of components is tracked through examining the transfer of information between agencies operating.

| 17. Key Words

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Spokane, WA

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Background and Purpose

In January 1996, former Secretary Peña set a goal of deploying the integrated metropolitan Intelligent Transportation System (ITS) infrastructure in 75[1] of the nation's largest metropolitan areas by the end of 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]*
>
> *-- former Secretary Peña, 1996*

In 1997, the United States Department of Transportation (U.S. DOT) initiated an effort to track progress toward fulfillment of this goal by conducting a survey of deployment in the nation's largest metropolitan areas. 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 traditional fixed assets can be accomplished by simply counting the number of such assets 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. In brief, it is often difficult to simply count the number of systems deployed without first developing 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 deployment, the U.S. DOT ITS Joint Program Office developed the metropolitan ITS deployment tracking methodology. This methodology tracks deployment of the nine components that make up the Metropolitan 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 nation's largest metropolitan areas. In addition, the integration links between agencies operating the infrastructure are also tracked.

Data were gathered on deployment and integration in the 78 major metropolitan areas in 1997,1999, 2000, 2002, and 2004. However, ITS deployment in the nation's largest metropolitan areas, does not include coverage of deployments in medium sized cities and non-urban (rural) statewide areas. By doing so, the metropolitan survey effort misses important deployments and

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[1] Since former Secretary Peña'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 former Secretary of Transportation Peña at the Transportation Research Board in Washington, DC on January 10, 1996.

falls short of presenting a truly national picture of the state of ITS deployment. During the spring and summer of 2002, the U.S. DOT undertook a new data collection effort for the purpose of examining ITS deployment progress in the nation's largest metropolitan areas and expanded the survey to include statewide and rural deployment as well as selected medium sized cities experiencing traffic management challenges due to rapid growth. Thirty medium sized cities were added to the survey effort.

The next section contains a summary of the results for the city of Spokane and for the nation as a whole. This is followed by detailed information on each infrastructure component for Spokane. Included in this report is a set of appendices containing tables with all the indicators, a list of local contacts surveyed along with a status of their response to the survey, and a summary of the data collected from the surveys.

Agencies are encouraged to review the data presented in this report for completeness and accuracy and to direct any comments or corrections to the contacts listed below:

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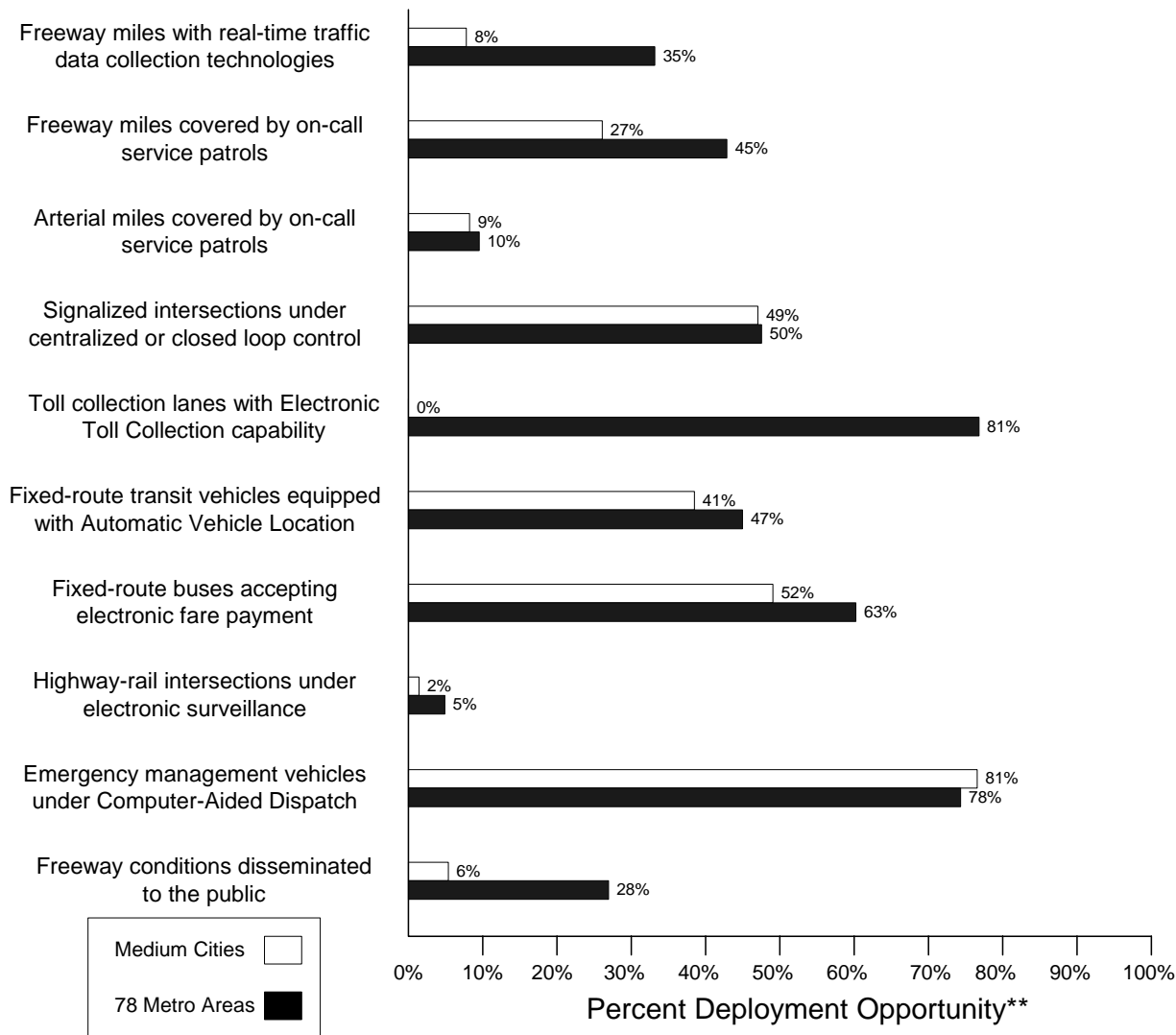
Summary 2004 Survey Results

Component

Deployment indicators have been developed for two broad areas of interest: (1) the individual components, including their basic functions and characteristics and (2) integration of components, including how these components work together to provide coordinated regional service. As mentioned earlier, these indicators are expressed as percentages of the possible deployment opportunity and not necessarily what should be deployed based on local needs. Requirements for deployment and integration between each component will vary based on local conditions and cannot be assigned without extensive coordination with individual metropolitan areas.

The following two figures portray the surrogate indicators for each of the nine components in Spokane and the same indicators at the national level. These are judged to be the single best representative of a component and are being used as summary indicators for each component. The summary indicators are expressed as a percentage; however, because deployment goals have yet to be established, these indicators should not be read as a comparison of what is deployed versus eventual deployment goals. Instead, they only reflect what is deployed compared to full market saturation (i.e., opportunity for deployment).

Each component indicator was selected to reflect a critical function of the individual components. For example, in the case of Freeway Management, three basic functions were defined: surveillance, traffic control, and information display. The three indicators developed to reflect these functions are: percentage of freeway centerline miles under electronic surveillance (surveillance function), percentage of freeway entrance ramps managed by ramp meters (traffic control function), and percentage of freeway centerline miles covered by permanent Variable Message Signs (VMS) or Highway Advisory Radio (HAR). The indicators are surrogates that do not necessarily reflect the full breadth of metropolitan ITS deployment activity.

Data are shown for each year surveyed and, in addition, an estimate for what the level of deployment will be in the year 2005.

Summary Indicators*

Freeway miles with real-time traffic data collection technologies
- Medium Cities: 8%
- 78 Metro Areas: 35%

Freeway miles covered by on-call service patrols
- Medium Cities: 27%
- 78 Metro Areas: 45%

Arterial miles covered by on-call service patrols
- Medium Cities: 9%
- 78 Metro Areas: 10%

Signalized intersections under centralized or closed loop control
- Medium Cities: 49%
- 78 Metro Areas: 50%

Toll collection lanes with Electronic Toll Collection capability
- Medium Cities: 0%
- 78 Metro Areas: 81%

Fixed-route transit vehicles equipped with Automatic Vehicle Location
- Medium Cities: 41%
- 78 Metro Areas: 47%

Fixed-route buses accepting electronic fare payment
- Medium Cities: 52%
- 78 Metro Areas: 63%

Highway-rail intersections under electronic surveillance
- Medium Cities: 2%
- 78 Metro Areas: 5%

Emergency management vehicles under Computer-Aided Dispatch
- Medium Cities: 81%
- 78 Metro Areas: 78%

Freeway conditions disseminated to the public
- Medium Cities: 6%
- 78 Metro Areas: 28%

Legend: Medium Cities, 78 Metro Areas

Percent Deployment Opportunity**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Spokane, WA   4

Spokane

Summary Indicators*

Freeway miles with real-time traffic data collection technologies
- 0%
- 0%
- 29%

Freeway miles covered by on-call service patrols
- 49%
- 49%
- 49%

Arterial miles covered by on-call service patrols
- 6%
- 0%
- 0%

Signalized intersections under centralized or closed loop control
- 0%
- 70%
- 77%

Toll collection lanes with Electronic Toll Collection capability
- 0%
- 0%
- 0%

Fixed-route transit vehicles equipped with Automatic Vehicle Location
- 0%
- 0%
- 0%

Fixed-route buses accepting electronic fare payment
- 100%
- 100%
- 100%

Highway-rail intersections under electronic surveillance
- 0%
- 3%
- 3%

Emergency management vehicles under Computer-Aided Dispatch
- 41%
- 100%
- 99%

Freeway conditions disseminated to the public
- 0%
- 0%
- 0%

Legend:
- 2002
- 2004
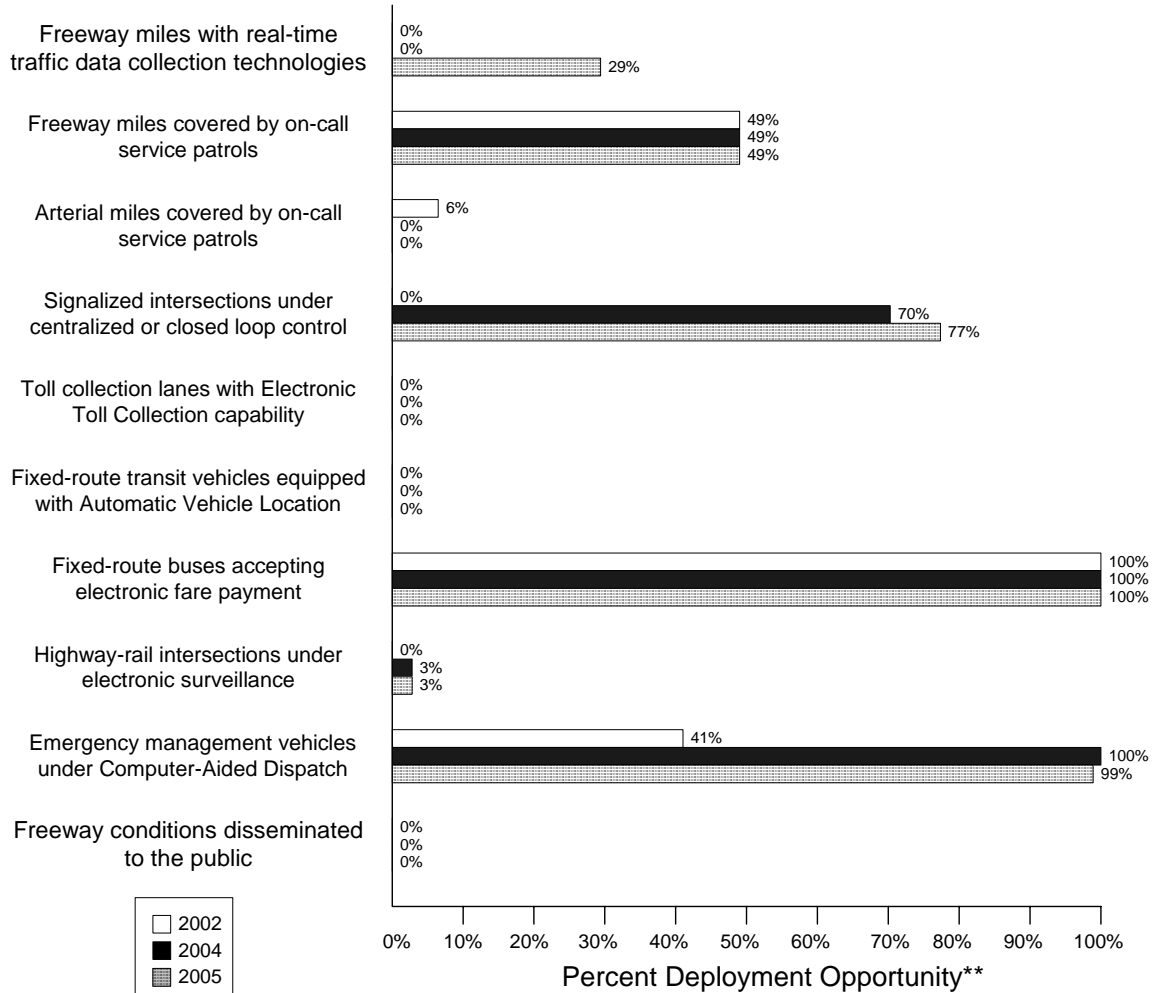- 2005

X-axis: Percent Deployment Opportunity** (0% to 100%)

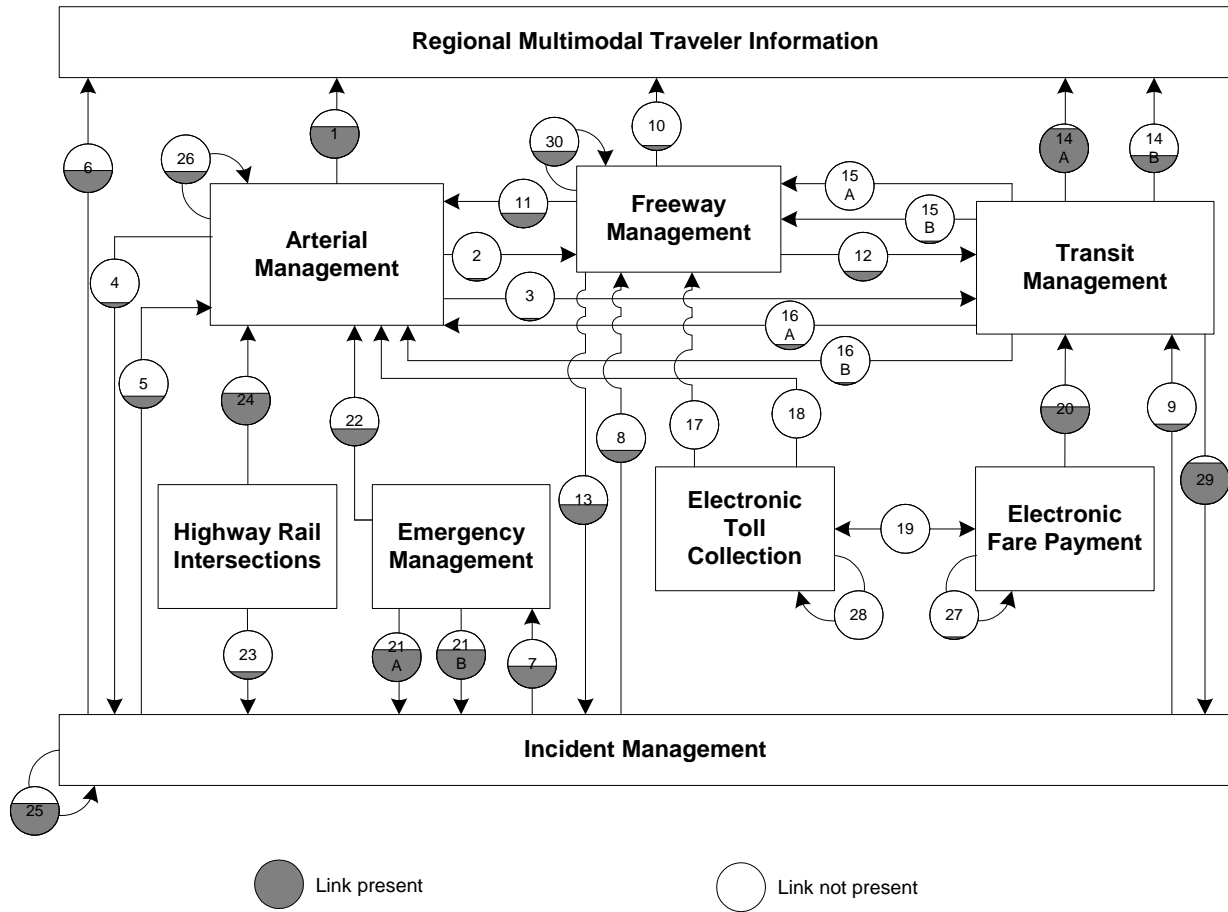* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.
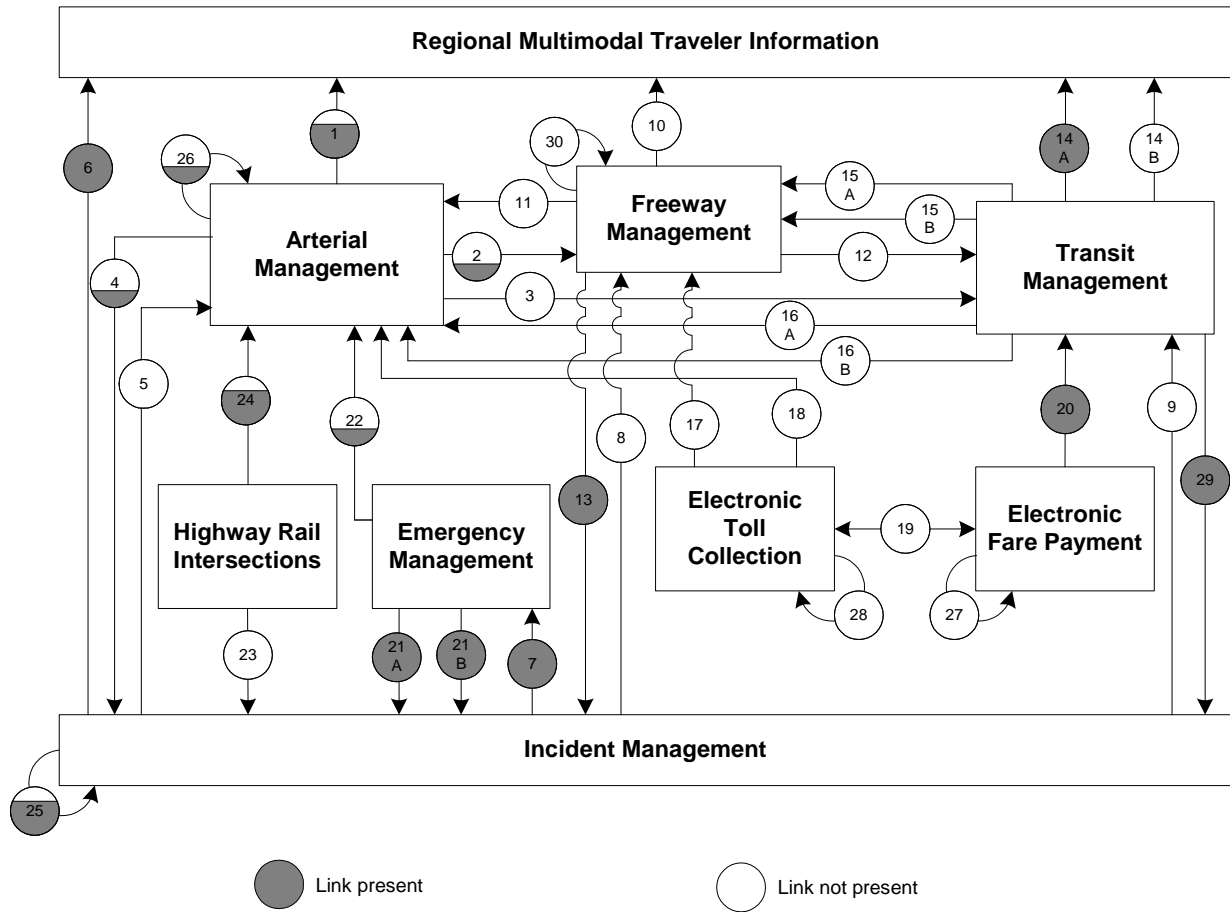
Integration

A critical aspect of ITS that provides much of its capability is the integration of individual components to form a unified regional traffic control system. The individual ITS components routinely collect information that is used for purposes internal to that component. For example, the Arterial Management component monitors arterial conditions to revise signal timing and to convey these conditions to travelers through such technologies as variable message signs and highway advisory radio. Other ITS components can make use of this information in formulating their control strategies. For example, Transit Management may alter routes and schedules based on real-time information on arterial traffic conditions, and Freeway Management may alter ramp metering or diversion recommendations based on the same information.

As with the component indicators, definitions for inter- and intra-component integration were developed for each component, and indicators, derived from these definitions, were produced for each component. A total of 34 individual integration indicators was specified and is portrayed in the third figure that follows. Each integration indicator has been assigned a number and an origin/destination path from one ITS infrastructure component to another.   For example, the number "10" identifies the integration of information from the Freeway Management component to the Regional Multimodal Traveler Information component. The following two figures portray the national integration indicators and the integration indicators for Spokane as of 2004.

Medium Size Metropolitan Areas Integration Links

Note: Shading indicates the value of the link. For example a circle half shaded equals 50%

Spokane Integration Links

Regional Multimodal Traveler Information

Arterial Management

Freeway Management

Transit Management

Highway Rail Intersections

Emergency Management

Electronic Toll Collection

Electronic Fare Payment

Incident Management

○ Link present

○ Link not present

Note: Shading indicates the value of the link. For example a circle half shaded equals 50%

Link	Description	Purpose
1	Arterial Management to Regional Multimodal Traveler Information	Arterial travel time, speed, and condition information are displayed by Regional Multimodal Traveler Information media.
2	Arterial Management to Freeway Management	Freeway Management Center monitors arterial travel times, speeds, and conditions using data provided from Traffic Signal Control in order to adjust ramp meter timing, lane control or HAR in response to changes in real-time conditions on a parallel arterial.
3	Arterial Management to Transit Management	Transit Management adjusts transit routes and schedules in response to arterial travel times, speeds, and conditions information collected as part of Traffic Signal Control.
4	Arterial Management to Incident Management	Incident Management monitors real-time arterial travel times, speeds, and conditions using data provided from Traffic Signal Control to detect arterial incidents and manage incident response activities.
5	Incident Management to Arterial Management	Traffic Signal Control monitors incident severity, location, and type information collected by Incident Management to adjust traffic signal timing or information provided to travelers in response to incident management activities.
6	Incident Management to Regional Multimodal Traveler Information	Incident location, severity, and type information are displayed by Regional Multimodal Traveler Information media.
7	Incident Management to Emergency Management	Incident severity, location, and type data collected as part of Incident Management are used to notify Emergency Management for incident response.
8	Incident Management to Freeway Management	Incident severity, location, and type data collected by Incident Management are monitored by Freeway Management for the purpose of adjusting ramp meter timing, lane control or HAR messages in response to freeway or arterial incidents.
9	Incident Management to Transit Management	Transit Management adjusts transit routes and schedules in response to incident severity, location, and type data collected as part of Incident Management.
10	Freeway Management to Regional Multimodal Traveler Information	Freeway travel time, speed, and condition information are displayed by Regional Multimodal Traveler Information media.

Link	Description	Purpose
11	Freeway Management to Arterial Management	Freeway travel time, speeds, and conditions data collected by Freeway Management are used by Traffic Signal Control to adjust arterial traffic signal timing or arterial VMS messages in response to changing freeway conditions.
12	Freeway Management to Transit Management	Transit Management adjusts transit routes and schedules in response to freeway travel times, speeds, and conditions information collected as part of Freeway Management.
13	Freeway Management to Incident Management	Incident Management monitors freeway travel time, speed, and condition data collected by Freeway Management to detect incidents or manage incident response.
14a	Transit Management to Regional Multimodal Traveler Information (static route information)	Transit routes, schedules, and fare information are displayed on Regional Multimodal Traveler Information media.
14b	Transit Management to Regional Multimodal Traveler Information (schedule adherence information)	Transit schedule adherence information are displayed on Regional Multimodal Traveler Information media.
15a	Transit Management to Freeway Management	Freeway ramp meters are adjusted in response to receipt of transit vehicle pre-emption signal.
15b	Transit Management to Freeway Management (transit vehicle probes)	Transit vehicles equipped as probes are monitored by Freeway Management for the purpose of determining freeway travel speeds or travel times.
16a	Transit Management to Arterial Management	Traffic signals are adjusted in response to receipt of transit vehicle pre-emption signal.
16b	Transit Management to Arterial Management (transit vehicle probes)	Transit vehicles equipped as probes are monitored by Traffic Signal Control for the purpose of determining arterial speeds or travel times.
17	Electronic Toll Collection to Freeway Management (ETC equipped probes)	Vehicles equipped with electronic toll collection (ETC) tags are monitored by Freeway Management for the purpose of determining freeway travel speeds or travel times.
18	Electronic Toll Collection to Arterial Management (ETC equipped probes)	Vehicles equipped with electronic toll collection (ETC) tags are monitored by Traffic Signal Control for the purpose of determining arterial travel speeds or travel times.
19	Electronic Fare Payment and Electronic Toll Collection	Transit operators accept ETC- issued tags to pay for transit fares.
20	Electronic Fare Payment to Transit Management	Rider ship details collected as part of Electronic Fare Payment are used in transit service planning by Transit Management.

Link	Description	Purpose
21a	Emergency Management to Incident Management (incident notification)	Incident Management is notified of incident location, severity, and type by Emergency Management for the purpose of identifying incidents on freeways or arterials.
21b	Emergency Management to Incident Management (incident clearance)	Incident Management is notified of incident clearance activities by Emergency Management for the purpose of managing incident response on freeways or arterials.
22	Emergency Management to Arterial Management	Emergency Management vehicles are equipped with traffic signal priority capability.
23	Highway-rail intersections to Incident Management (crossing status)	Incident Management is notified of crossing blockages by Highway-rail intersection for the purpose of managing incident response.
24	Highway-rail intersections to Arterial Management (crossing status)	Highway-rail intersection and Traffic Signal Control are interconnected for the purpose of adjusting traffic signal timing in response to train crossing.
25	Incident Management intra-component	Agencies participating in formal working agreements or incident management plans coordinate incident detection, verification, and response.
26	Arterial Management intra-component	Agencies operating traffic signals along common corridors sharing information and possibly control of traffic signals to maintain progression on arterial routes.
27	Electronic Fare Payment intra-component.	Operators of different public transit services share common electronic fare payment media.
28	Electronic Toll Collection intra-component	Electronic Toll Collection agencies share a common toll tag for the purpose of facilitating "seam less" toll transactions.
29	Transit Management to Incident Management (incident reporting)	Transit agency operators or dispatchers report traffic incidents (e.g. stalled vehicles, crashes) as part of an organized regional incident management program.
30	Freeway Management intra-component	Freeway travel time, speeds, and conditions data collected by Freeway Management agencies are used by other Freeway Management agencies in response to changing freeway conditions for the purpose of adjusting ramp meter timing, lane control or HAR messages in response to freeway or arterial incidents.

Detailed 2004 Survey Results

The following figures summarize the complete set of component and integration indicators developed for the Spokane metropolitan area. In some cases a decrease in deployment or integration over time occurs. This may be due to differences in reporting from year to year, agencies responding one year and not the other, or an actual decrease in the level of deployment. The figures summarizing the component indicators consist of a bar chart portraying the deployment levels for 2002, 2004, and 2005 estimates.

Example: Calculating Component Indicators for Freeway Management

Consider a metropolitan area with 100 miles of freeway and 25 freeway entrance ramps. The area has no ramp meters, 10 freeway miles for which traffic data are collected electronically, and 5 freeway miles, which are covered by highway advisory radio.

The component indicator for electronic surveillance is calculated as (10/100) or 10%.

The component indicator for ramp meter control is calculated as (0/25) or 0%.

The component indicator for HAR coverage is calculated as (5/100) or 5%.

The summary indicator for the metropolitan area is calculated as (10%+0%+5%)/3 = 5%.

The figures summarizing the integration indicators consist of a diagram for each of the nine metropolitan ITS components portraying the integration level for 2004. Each diagram portrays the proportion of agencies providing information to a component (e.g., the flow of incident information from Incident Management to Freeway Management) and the proportion of agencies providing information from one component to other components (e.g., the flow of freeway travel condition information from Freeway Management to Arterial Management).

Example: Calculating Integration between Arterial Management and Regional Multimodal Traveler Information

Consider a metropolitan area with three arterial management agencies. One out of three provides information to the public using a Regional Multimodal Traveler Information Media (e.g., internet, kiosk, pager, etc...). The integration indicator is 1/3 or 33%.

Freeway Management Components

Spokane

Freeway Management*
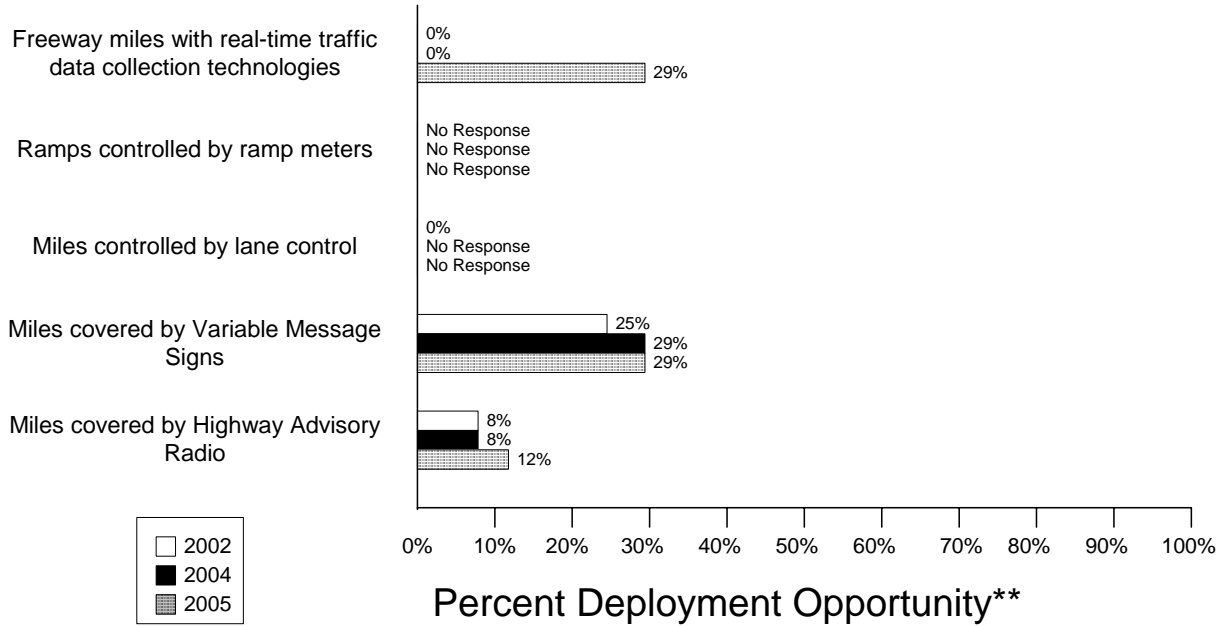
Freeway miles with real-time traffic data collection technologies
- 0%
- 0%
- 29%

Ramps controlled by ramp meters
- No Response
- No Response
- No Response

Miles controlled by lane control
- 0%
- No Response
- No Response

Miles covered by Variable Message Signs
- 25%
- 29%
- 29%

Miles covered by Highway Advisory Radio
- 8%
- 8%
- 12%

Legend:
- ☐ 2002
- ■ 2004
- ▦ 2005

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

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** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Freeway Management Integration

Spokane
Freeway Management Integration*

<u>Inputs</u>   <u>Outputs</u>

2 33% → **Arterial Conditions**

8 0% → **Incident Conditions**

15 a 0% → **Ramp Priority**

15 b 0% → **Probe Times**

17 0%

30 0%

11 0% → **Adjust Arterial Signals**

10 0% → **Affect Travel Decisions**

12 0% → **Adjust Routes/ Schedules**

13 100% → **Detect Inc. & Adjust Response**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Freeway and Arterial Incident Management Components

Spokane

Freeway and Arterial Incident Management*

Freeway miles under incident detection algorithms	0% 0% 0%
Freeway miles under free cell phone call to a dedicated number	No Response No Response No Response
Freeway miles covered by surveillance cameras	12% 20% 31%
Freeway miles covered by on-call service patrols	49% 49% 49%
Arterial miles under incident detection algorithms	0% 0% 0%
Arterial miles under free cell phone call to a dedicated number	No Response No Response 0%
Arterial miles covered by surveillance cameras	2% 0% 2%
Arterial miles covered by on-call service patrols	6% 0% 0%

Legend: □ 2002 ■ 2004 ▒ 2005

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

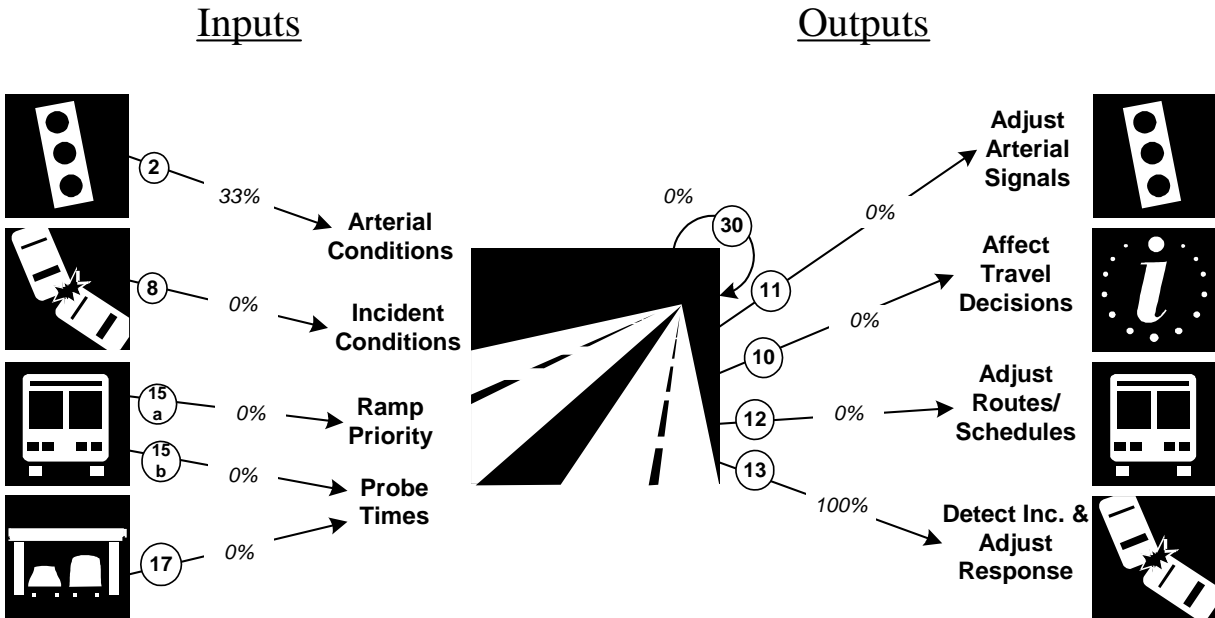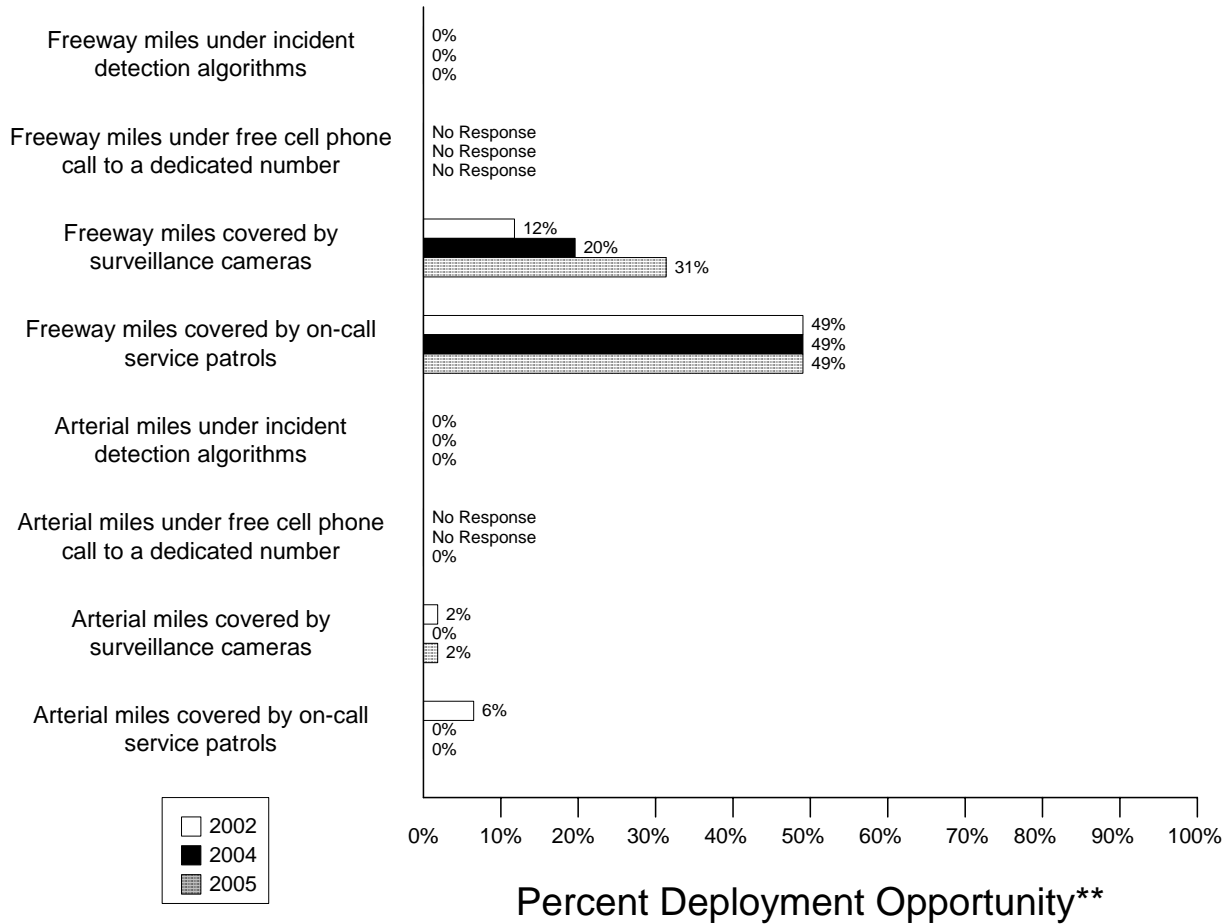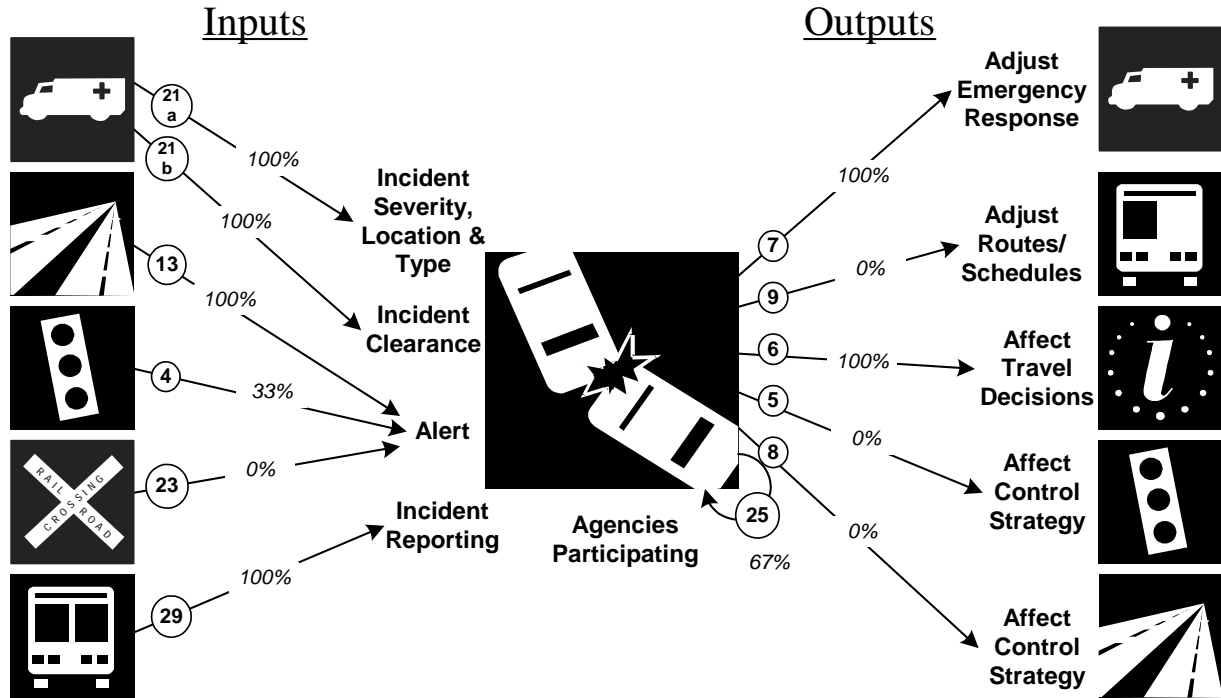## Percent Deployment Opportunity**

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Spokane
Incident Management Integration*

Inputs

Outputs

21a

21b 100%

Incident
Severity,
Location &
Type

13 100%

100%

Incident
Clearance

4 33%

Alert

23 0%

Incident
Reporting

29 100%

Agencies
Participating

25 67%

7 100%

Adjust
Emergency
Response

9 0%

Adjust
Routes/
Schedules

6 100%

Affect
Travel
Decisions

5

8 0%

Affect
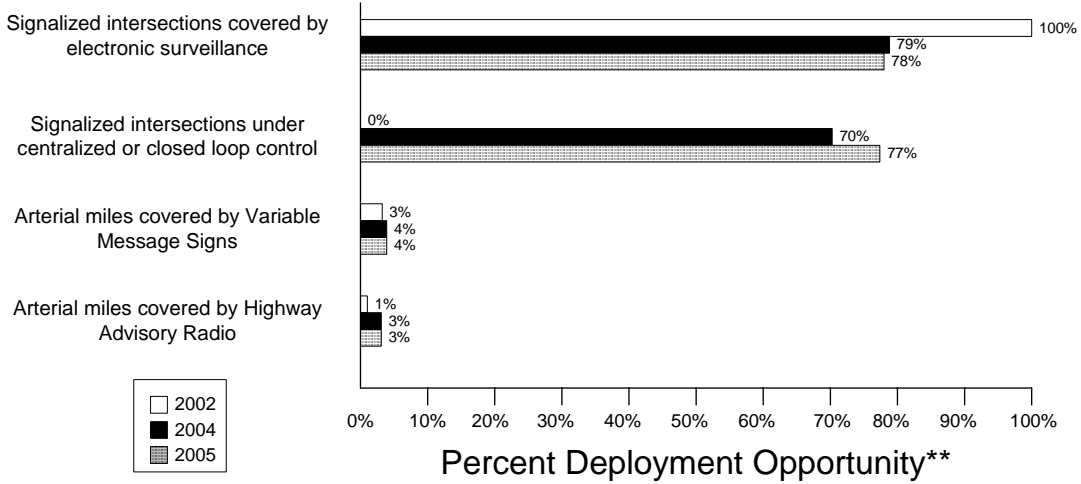Control
Strategy

0%

Affect
Control
Strategy

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Arterial Management Components

Spokane

Arterial Management*

Signalized intersections covered by electronic surveillance	100% / 79% / 78%
Signalized intersections under centralized or closed loop control	0% / 70% / 77%
Arterial miles covered by Variable Message Signs	3% / 4% / 4%
Arterial miles covered by Highway Advisory Radio	1% / 3% / 3%

Legend: 2002, 2004, 2005

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
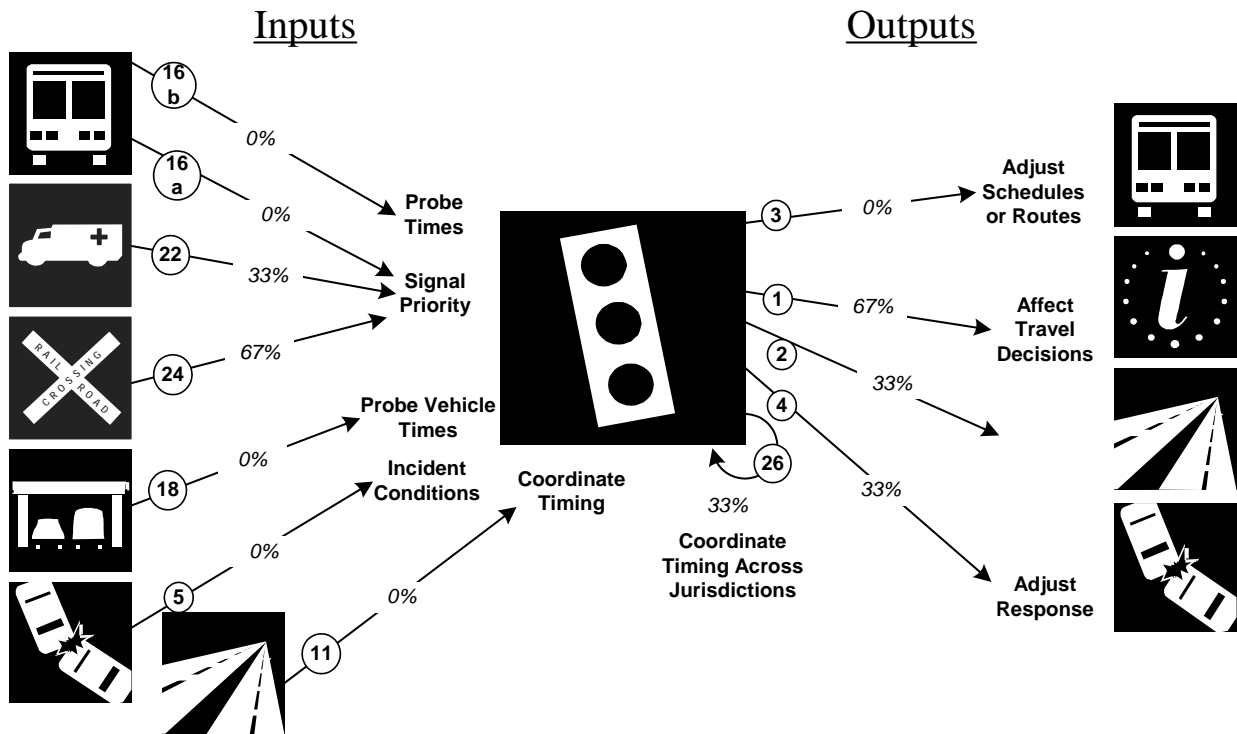
Percent Deployment Opportunity**

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Spokane

Arterial Management Integration*

<u>Inputs</u>   <u>Outputs</u>
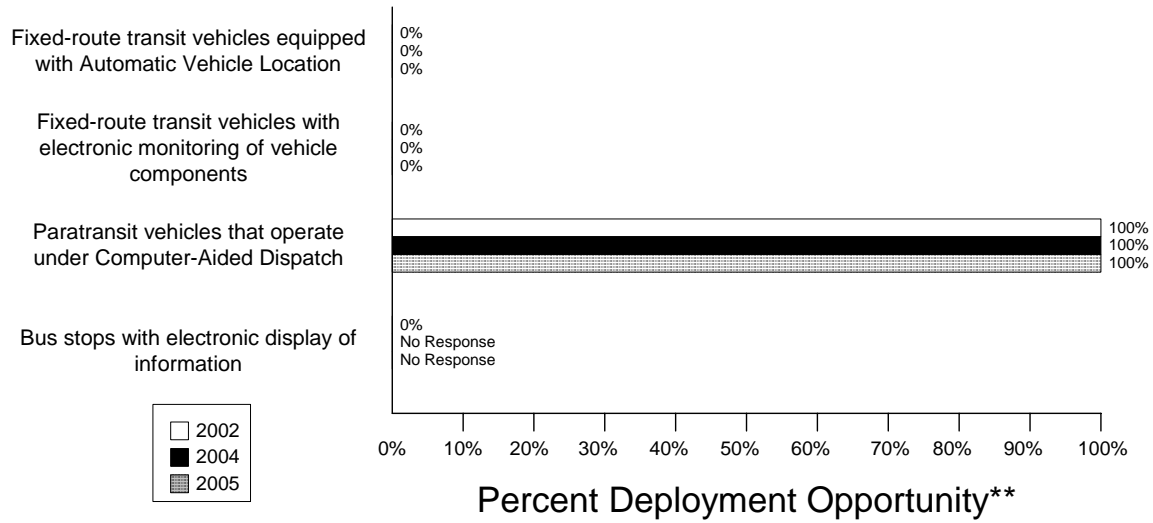

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Transit Management Components

Spokane

Transit Management*

Fixed-route transit vehicles equipped with Automatic Vehicle Location
0%
0%
0%

Fixed-route transit vehicles with electronic monitoring of vehicle components
0%
0%
0%

Paratransit vehicles that operate under Computer-Aided Dispatch
100%
100%
100%

Bus stops with electronic display of information
0%
No Response
No Response

Legend:
☐ 2002
■ 2004
▦ 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
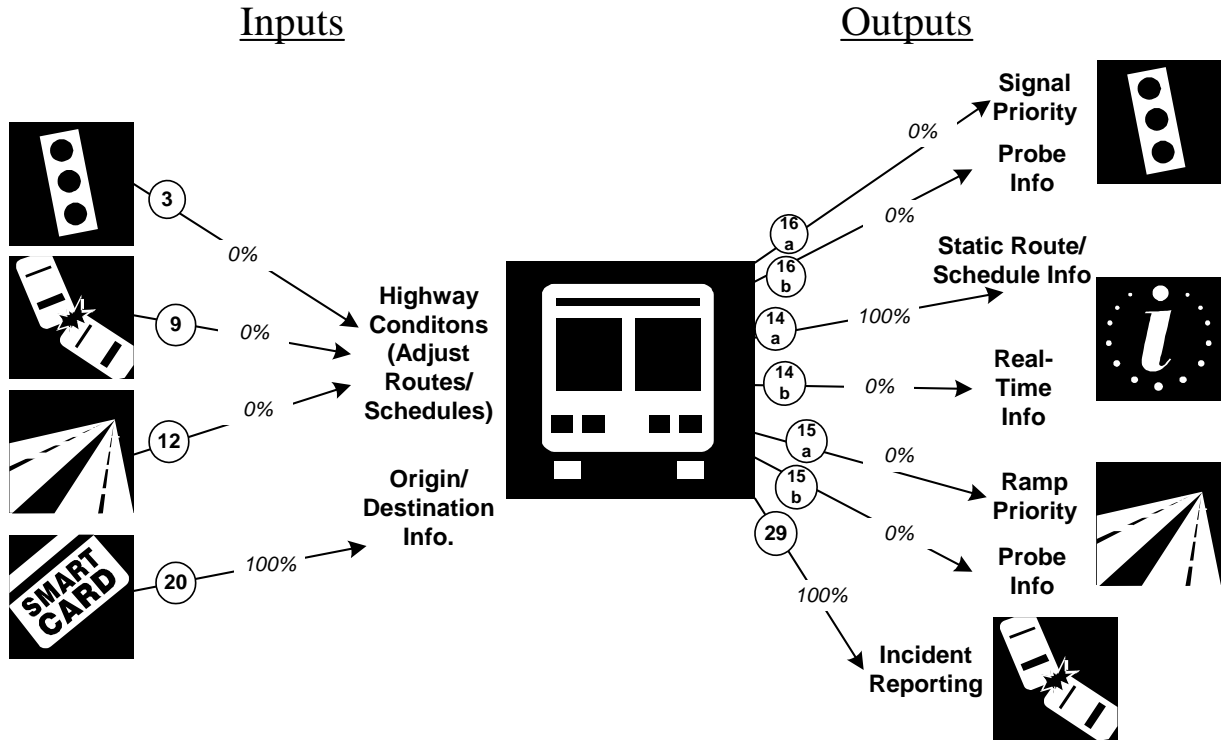
Percent Deployment Opportunity**

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** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Spokane
Transit Management Integration*

Inputs   ## Outputs

3

0%

9   0%

12   0%

Highway
Conditons
(Adjust
Routes/
Schedules)

Origin/
Destination
Info.

20   100%

16
a

16
b

14
a

14
b

15
a

15
b

29

Signal
Priority

0%

Probe
Info

0%

Static Route/
Schedule Info

100%

Real-
Time
Info

0%
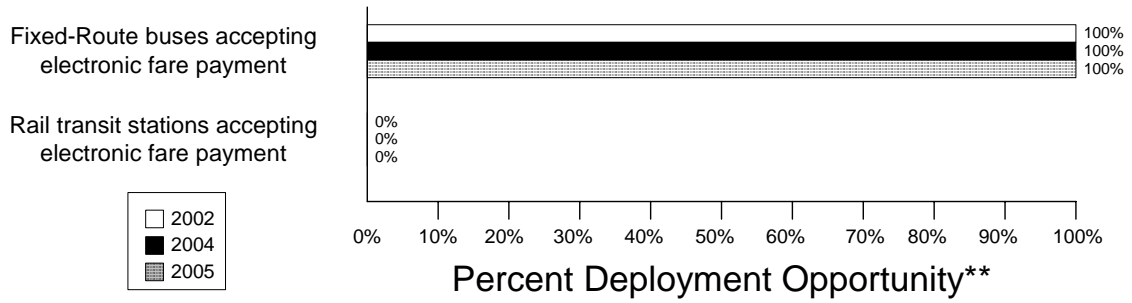
Ramp
Priority

0%

Probe
Info

100%

Incident
Reporting

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Electronic Fare Payment Components

Spokane

Electronic Fare Payment*

Fixed-Route buses accepting
electronic fare payment
- 100%
- 100%
- 100%

Rail transit stations accepting
electronic fare payment
- 0%
- 0%
- 0%

Legend:
- ☐ 2002
- ■ 2004
- ▦ 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
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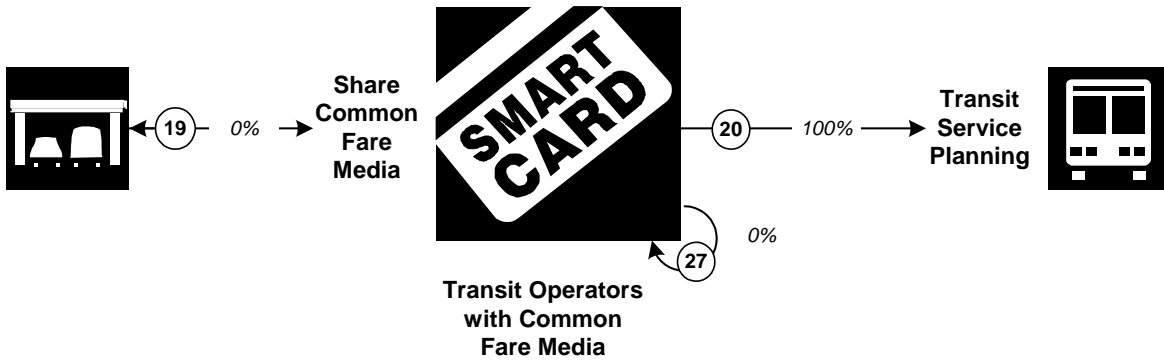
Spokane

Electronic Fare Payment Integration*

<u>Inputs</u>   <u>Outputs</u>

Share Common Fare Media

19 — 0% →

20 — 100% →

Transit Service Planning

27 — 0%

Transit Operators with Common Fare Media

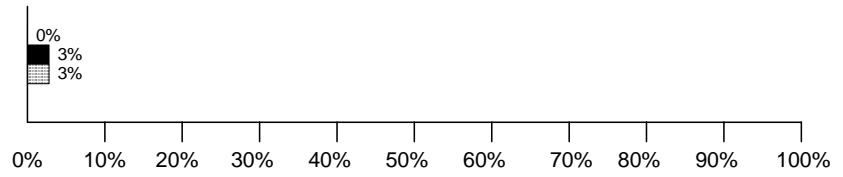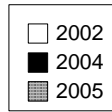* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Highway-Rail Intersections Components

Spokane

Highway-Rail Intersections*

Highway-rail intersections under
electronic surveillance

☐	2002
■	2004
▦	2005

0%
3%
3%

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

Percent Deployment Opportunity**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.
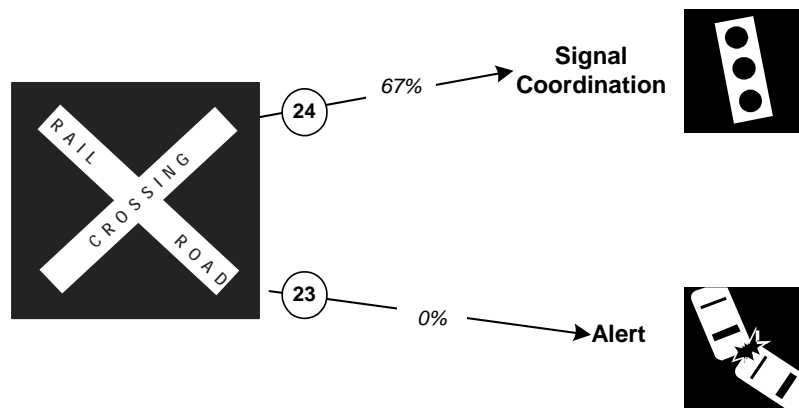
Spokane

Highway-Rail Intersections Integration*

Inputs   Outputs

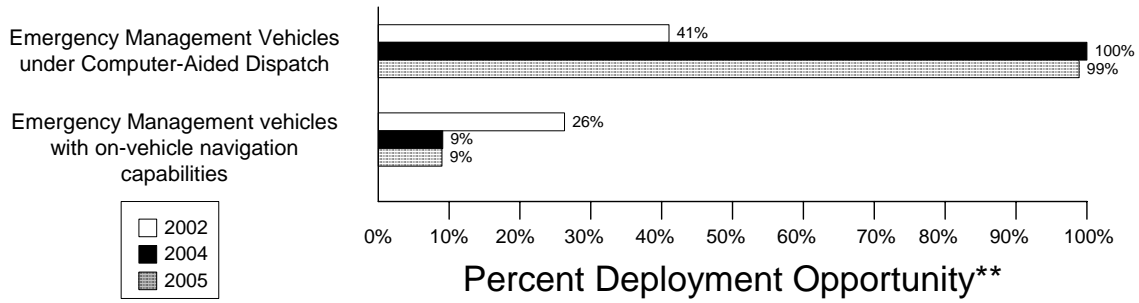24   67%   **Signal Coordination**

23   0%   ►**Alert**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Emergency Management Components

Spokane

Emergency Management*

Emergency Management Vehicles under Computer-Aided Dispatch
- 41%
- 100%
- 99%

Emergency Management vehicles with on-vehicle navigation capabilities
- 26%
- 9%
- 9%

Legend:
- ☐ 2002
- ■ 2004
- ▦ 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.
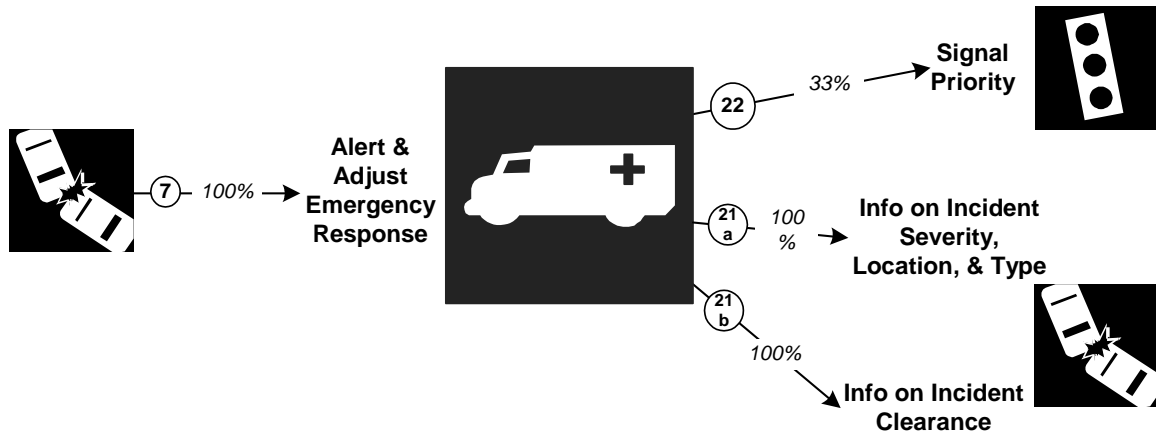
Spokane

Emergency Management Integration*

<u>Inputs</u>   <u>Outputs</u>

Signal Priority

33%

22

Alert & Adjust Emergency Response

7 *100%*

21 a *100 %*

Info on Incident Severity, Location, & Type
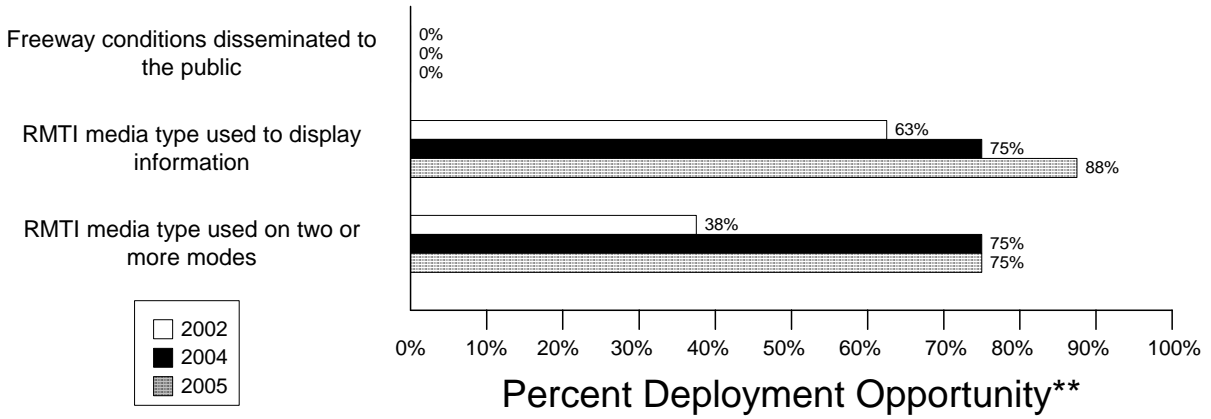
21 b

100%

Info on Incident Clearance

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Regional Multimodal Traveler Information Components

Spokane

Regional Multimodal Traveler Information*

Freeway conditions disseminated to the public
0%
0%
0%

RMTI media type used to display information
63%
75%
88%

RMTI media type used on two or more modes
38%
75%
75%

Legend:
- ☐ 2002
- ■ 2004
- ▦ 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

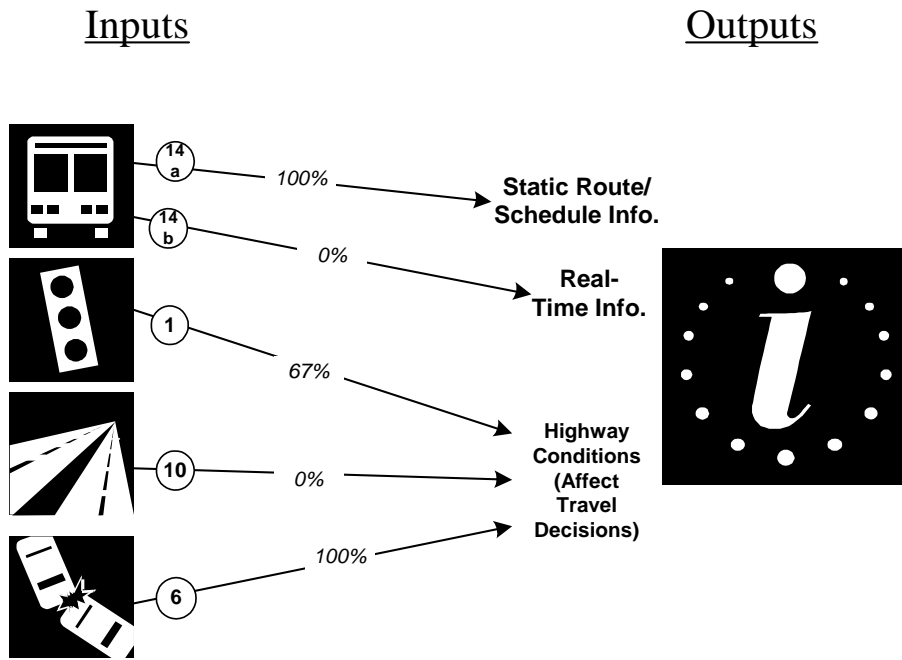* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Spokane, WA   27

Spokane

Regional Multimodal Traveler Information Integration*

<u>Inputs</u>   <u>Outputs</u>

14
a   100% ————→   **Static Route/
Schedule Info.**

14
b   0% ————→   **Real-
Time Info.**

1

67%

**Highway
Conditions
(Affect
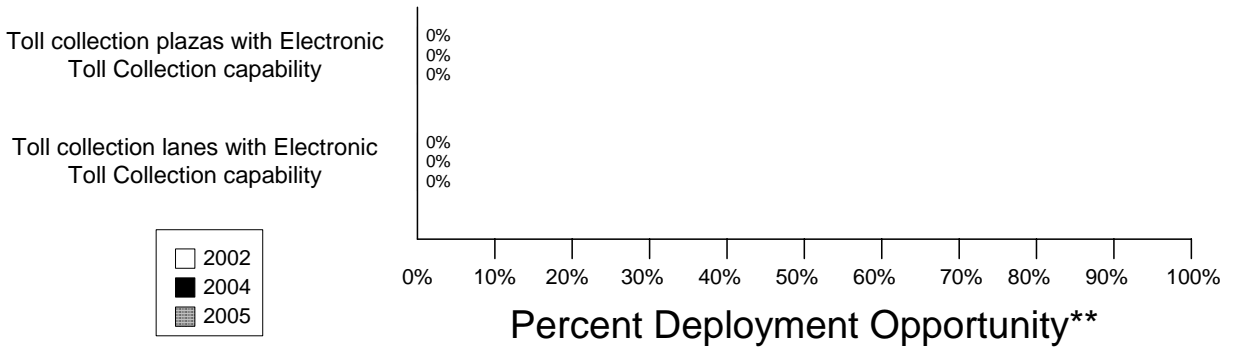Travel
Decisions)**

10   0% ————→

6   100%

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Electronic Toll Collection Components

Spokane

Electronic Toll Collection*

Toll collection plazas with Electronic
Toll Collection capability
0%
0%
0%

Toll collection lanes with Electronic
Toll Collection capability
0%
0%
0%

☐ 2002
■ 2004
▦ 2005

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

Percent Deployment Opportunity**

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
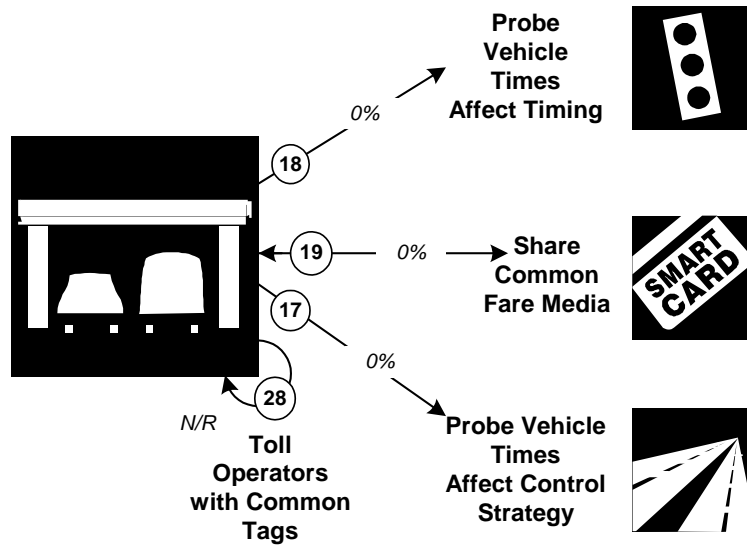** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Spokane

Electronic Toll Collection Integration*

<u>Inputs</u>   <u>Outputs</u>

Probe Vehicle Times Affect Timing

0%

18

19   0%   **Share Common Fare Media**

17

0%

28

N/R

Toll Operators with Common Tags

Probe Vehicle Times Affect Control Strategy

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

Appendix A. Component Indicators

Freeway Management Component Indicators

Description	2002	2004	2005
Freeway centerline miles are under electronic surveillance for monitoring traffic flow	0%	0%	29%
Freeway entrance ramps are controlled by ramp meters			
Freeway centerline miles will be controlled by lane control	0%	NR	NR
Freeway miles are covered by VMS	25%	29%	29%
Freeway miles are covered by HAR	8%	8%	12%

Incident Management Component Indicators

Description	2002	2004	2005
Freeway miles covered by incident detection algorithms	0%	0%	0%
Freeway miles covered by free cellular phone calls to a dedicated number	NR	NR	NR
Freeway miles covered by surveillance cameras	12%	20%	31%
Freeway miles covered by on-call publicly sponsored service patrol or towing services	49%	49%	49%
Arterial miles covered by incident detection algorithms	0%	0%	0%
Arterial miles covered by free cellular phone calls to a dedicated number	NR	NR	NR
Arterial miles covered by surveillance cameras	2%	0%	2%
Arterial miles covered by on-call publicly-sponsored service patrol or towing services	6%	0%	0%

Arterial Management Component Indicators

Description	2002	2004	2005
Signalized intersections are covered by electronic surveillance for monitoring traffic flow	100%	79%	78%
Signalized intersections are under centralized or closed loop control	0%	70%	77%
Arterial miles are covered by VMS	3%	4%	4%
Arterial miles are covered by HAR	1%	3%	3%

Electronic Toll Collection Component Indicators

Description	2002	2004	2005
Toll collection plazas with ETC capability	NR	NR	NR
Toll collection lanes with ETC capability	NR	NR	NR

Transit Management Component Indicators

Description	2002	2004	2005
Fixed-route transit vehicles are equipped with Automatic Vehicle Location (AVL)	0%	0%	0%
Fixed-route transit vehicles are equipped with electronic monitoring of vehicle component	0%	0%	0%
Paratransit vehicles operate under computer-aided dispatch	100%	100%	100%
Bus stops display information to the public	0%		

Electronic Fare Payment Component Indicators

Description	2002	2004	2005
Fixed-route transit vehicles that accept electronic payment	100%	100%	100%
Rail transit stations that accept electronic payment	NR	0%	0%

Highway Rail Intersection Component Indicators

Description	2002	2004	2005
Highway-rail intersections are under electronic surveillance	0%	3%	3%

Emergency Management Component Indicators

Description	2002	2004	2005
Public sector emergency vehicles that operate under computer-aided dispatch	41%	100%	99%
Public sector emergency vehicles that have in-vehicle route guidance capability	26%	9%	9%

Regional Multimodal Traveler Information (RMTI) Component Indicators

Description	2002	2004	2005
Freeway conditions disseminated to travelers	0%	0%	0%
Possible RMTI media types are used to display information to travelers	63%	75%	88%

Description	2002	2004	2005
Possible RMTI media are used to display information on *two or more modes* to travelers	38%	75%	75%

Appendix B. Integration Indicators

IndicatorsLink Description	2002	2004
1. Arterial Management agencies disseminate arterial travel times, speeds, and conditions to the public	0%	67%
2. Arterial Management agencies sending information to Freeway Management	0%	33%
3. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Transit Management	0%	0%
4. Arterial Management agencies sending arterial conditions to Incident Management	0%	33%
5. Incident Management agencies transfer information describing incident severity, location, and type to Arterial Management agencies	0%	0%
6. Incident Management agencies disseminate information describing incident severity, location, and type to the public	100%	100%
7. Incident management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	0%	100%
8. Incident Management agencies sending information describing incident severity, location, and type to Freeway Management agencies	0%	0%
9. Incident Management agencies transfer information describing incident severity, location, and type to Transit Management agencies	0%	0%
10. Freeway Management agencies disseminating freeway conditions to the public	0%	0%
11. Freeway Management agencies sending information to Arterial Management	0%	0%
12. Freeway Management agencies sending freeway conditions to Transit Management	0%	0%
13. Freeway Management agencies sending freeway conditions to Incident Management	0%	100%
14a. Transit Management agencies disseminate information describing transit routes, schedules, and fares to travelers	100%	100%
14b. Transit Management agencies disseminate information describing schedule/route adherence to travelers	0%	0%
15a. Transit management agencies with vehicles equipped with ramp meter priority	0%	0%
15b. Transit Management agencies with vehicles equipped as probes	0%	0%
16a. Transit management agencies with vehicles equipped with traffic signal priority	0%	0%
16b. Transit Management agencies have vehicles equipped as probes on arterials	0%	0%

IndicatorsLink Description	2002	2004
17. Freeway Management agencies receiving freeway conditions from vehicle probes	0%	0%
18. Number of Arterial Management agencies receiving information from vehicle probes	0%	0%
19. Transit agencies that accept electronic payment through the use of electronic toll collection media	0%	0%
20. Transit Management agencies using Electronic Fare Payment data in transit service planning	0%	100%
21a. Incident management agencies receiving incident severity from Emergency Management	100%	100%
21b. Incident management agencies receiving incident clearance activities from Emergency Management	100%	100%
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	33%	33%
23. Arterial Management agencies receive information on highway-rail intersection crossing blockages for the purpose of managing incident response	0%	0%
24. Arterial Management agencies have traffic signals within 200 feet of a highway-rail intersection with the capability of having their signal timing adjusted in response to a train crossing	100%	67%
25. Police, fire, and EMS agencies participating in a formal incident management plan/team	100%	67%
26. Arterial Management agencies under cooperative agreement to share traffic signal timing for coordinated response	0%	33%
27. Transit Management agencies that use the same electronic payment system	0%	0%
28. Toll operators using common toll tag technology		
29. Transit Management agencies report traffic incidents as part of an organized regional incident management program	100%	100%
30. Freeway Management agencies sending information to another Freeway Management agency	0%	0%

Appendix C. Surveyed Agencies

Spokane

	2002			2004	
	Date Out	**Date In**		**Date Out**	**Date In**
Arterial Management					
Spokane City Public Works	7/24/2002			6/14/2004	11/4/2004
Spokane County Public Works	7/24/2002	8/28/2002		6/14/2004	7/13/2004
Washington State Department of Transportation Eastern Region	7/24/2002	9/4/2002		7/7/2004	8/19/2004
Emergency Management					
Spokane City Fire Department	7/24/2002	8/8/2002		5/17/2004	6/13/2004
Spokane City Police Department	7/24/2002	9/9/2002		5/17/2004	8/11/2004
Spokane County Sheriff Department	7/25/2002	9/3/2002		5/17/2004	6/23/2004
Freeway Management					
Washington State Department of Transportation Eastern Region	7/24/2002	9/11/2002		7/7/2004	8/19/2004
MPO					
Spokane Regional Transportation Council	Not Surveyed in 2002			6/1/2004	6/28/2004

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