

A Report Prepared by

The Intelligent Transportation Society of America

**SIZING THE U.S. AND NORTH AMERICAN INTELLIGENT
TRANSPORTATION SYSTEMS MARKET: MARKET DATA ANALYSIS OF *ITS*
REVENUES AND EMPLOYMENT**

August 2011

This report is based upon work supported by the U.S. Department of Transportation (U.S. DOT) Research and Innovative Technology Administration (RITA) under contract number DTFH61-08-D-00011.

The U.S. DOT RITA commissioned this work to characterize the scope and scale of the Intelligent Transportation Systems (*ITS*) industry, particularly the aspects within the private sector. The *ITS* industry has never been extensively characterized, particularly those products and services within the private sector. These private sector *ITS* products and services are growing in terms of service offerings, scale, visibility and use by consumers and public agencies. To serve its role in supporting research to advance the *ITS* industry, the U.S. DOT RITA wanted to better understand the scope, scale and growth projections within the private sector industry.

The U.S. DOT RITA considers the results of this analysis to be estimates based on limited survey data and modeling techniques. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the U.S. DOT RITA.

The U.S. DOT RITA would like to thank those companies who participated in the survey.

The United States Government assumes no liability for the contents of this report or its thereof.

FOREWORD

I am pleased to present this Market Data Analysis (MDA) Report, which summarizes the results of a two-phase study commissioned by the U.S. Department of Transportation Research and Innovative Technology Administration (RITA) and conducted by the Intelligent Transportation Society of America (ITS America). It represents the first systematic attempt to estimate the contribution and impact of *ITS* on the U.S. and North American economies.

In Phase 1, we collected information from two states about their *ITS* expenditures and staffing and from 53 private sector *ITS* companies about their *ITS* revenues and employment. In Phase 1, we focused on five *ITS* sectors, tested our methodology, and established an updatable *ITS* database.

For Phase 2, U.S. DOT decided to focus on the supply-side of the *ITS* equation—leaving the public sector-demand side analysis for a possible future endeavor. In keeping with this focus, ITS America expanded the database to the full range of private sector *ITS* companies and major suppliers with revenues and employment in North America. The new database information – in combination with econometric modeling – has enabled ITS America to estimate the size of the North American Intelligent Transportation Systems market and provide policy makers with credible numbers for employment strength, private sector revenues, and related *ITS* employment. With almost 300 *ITS* companies responding to the survey and 3,000 *ITS* companies identified, we expect that the model will be valuable in forecasting future industry growth and impact on the economy.

Throughout the study, ITS America worked closely with U.S. DOT and a Technical Expert Group (TEG), chaired by David St. Amant (President and Chief Operating Officer of the Econolite Group, Inc.), a member of ITS America's Board of Directors, and former Chair of its Policy and Business Council. The other members were Michigan's Department of Transportation Director Kirk Steudle, who also serves on our Board of Directors, and Richard Weiland of Weiland Consulting Company. Joining the group for the Phase 2 effort was Shawn Turner of the Texas Transportation Institute.

The study also benefited greatly from the generous counsel of Mark Bush of the American Association of State Highway and Transportation Officials, Steve Keppler of the Commercial Vehicle Trade Association, and Bruce Eisenhart of Consensus Systems Technologies Corporation, all of whom provided significant feedback on our list of *ITS* products and services derived from the National *ITS* Architecture. We also acknowledge the valuable assistance of the U.S. Patent and Trademark Office, which provided us with a keener understanding of innovation trends within the *ITS* industry.

Finally, this report would not have been possible without the cooperation of industry respondents, who generously shared their company information to benefit this study; without the expertise of our econometric modeling partners, IHS Global Insights; or without the research and thoughtful analysis of the ITS America study team and staff.

I firmly believe that with this effort we have a solid foundation for a fact-based understanding of the economic impact of the diverse and expanding *ITS* industry and its potential to improve transportation safety and the livability and sustainability of our communities.

Scott F. Belcher

President and CEO

Intelligent Transportation Society of America

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ACRONYMS

| | |
|-------------|--|
| AASHTO | American Association of State and Highway Transportation Officials |
| BEA | Bureau of Economic Analysis |
| BLS | Bureau of Labor Statistics |
| CCTV | Closed-Circuit Television |
| CVSA | Commercial Vehicle Safety Alliance |
| CY | Calendar Year |
| EXP | Exponent |
| FTE | Full-Time Equivelent |
| ISO/TC204 | International Organization for Standardization's Technical Committee 204 |
| <i>ITS</i> | Intelligent Transportation Systems |
| ITS America | Intelligent Transportation Society of America |
| MDA | Market Data Analysis |
| NAICS | North American Industry Classification System |
| NETS | National Establishment Time Series |
| OEM | Original Equipment Manufacturer |
| RITA | Research and Innovative Technology Administration |
| TEG | Technical Expert Group |
| U.S. DOT | United States Department of Transportation |
| USPTO | United States Patent and Trademark Office |

EXECUTIVE SUMMARY

The Intelligent Transportation Society of America (ITS America) has completed a two-phase study, commissioned by the U.S. Department of Transportation Research and Innovative Technology Administration (RITA), to develop accurate and comprehensive estimates of the breadth and size of the U.S. and North American Intelligent Transportation Systems (*ITS*) markets. Prior to this study, the *ITS* industry, and particularly the private sector portion, had never been extensively characterized.

ITS is the collective term for the use of electronics, communications, and information processing technology to improve all aspects of transportation—including public transportation. As transportation management officials have—over the past 10 to 20 years—proactively applied *ITS* to solve transportation problems, they have been able to multiply positive impacts and improve the use of transportation resources. Such applications also have positive effects on transportation system efficiency and sustainability, safety, the environment, congestion, and traveler mobility and convenience.

Supporting research to advance the *ITS* industry, U.S. DOT RITA commissioned this supply-side study to better understand the scope, scale, and growth projections within the private sector, where service offerings, scale, visibility, and use by consumers and public agencies—particularly state and local government agencies—is growing. The study is based on a private sector survey of companies and extensive econometric modeling.

ITS America and its partner, IHS Global Insight, identified and validated 3,000 U.S. companies operating in *ITS*. The study identified total company revenues and then focused in on the less than three percent attributable to *ITS* end-use products and services—the ultimate applications for which these *ITS* products/services have been designed.¹ The report estimates Calendar Year (CY) 2009 U.S. *ITS* company revenues of \$48 billion for end-use *ITS* manufacturing products (\$26.1 billion) and end-use *ITS* services (\$21.9 billion).

The research attributes almost 180,000 private sector jobs to the U.S. *ITS* end-use market alone, with a total of 445,000 jobs in the total industry value chain. Projections for the U.S. *ITS* industry are for continuing growth, with CY 2015 projected end-use revenue increasing by almost 41 percent (over CY 2009) and private sector employment of more than 205,000. Total industry employment—including providers of enabling services and *ITS* components as well as end-use products and services—is projected to exceed 500,000. U.S. patent statistics likewise point to continued *ITS* industry growth and

¹ The Bureau of Economic Analysis (BEA), in *ITS* Internationally-harmonized classification system for exported and imported merchandise, classifies products and services based on principal use rather than the physical characteristics of the merchandise. This study used BEA input/output tables for each of 86 *ITS* industry sub-groups to estimate end-use product and service revenues and employment as well as revenues/employment for *ITS* enabling services and *ITS* components.

innovation, with U.S. *ITS*-related patent applications growing 17 percent from 2007 to 2008, when overall patent applications were static.

This landmark supply-side market analysis used a four-stage process:

- **Stage 1** focused on understanding and defining private sector products and services in the *ITS* universe. Researchers updated and vetted the National *ITS* Architecture's market packages to ensure inclusion of the current, full range of private sector *ITS* products and services. This product/service list served as the foundation for the market estimate and a critical *ITS* filter throughout the study.
- **Stage 2** identified North American companies active in *ITS* using internal industry data bases, international listings of *ITS* companies, *ITS* exhibitor listings, and extensive internet and report research to compile a list of more than 15,000 potential *ITS*-related companies. Researchers winnowed down this list—eliminating duplicates, subsidiaries, those not in the *ITS* market, to identify the 3,000 *ITS* companies on which the data is based.
- **Stage 3** sought primary data from identified *ITS* companies via an electronic survey, tested in the study's initial phase. More than 10 percent (295) of the companies responded and provided sensitive information about *ITS* revenues, private sector employment, and industry sector identification. Survey respondents included companies engaged in all market aspects of *ITS*, including (in descending order of participation) traffic management, traveler information, public transportation, emergency management, maintenance and construction operations, archived data management, commercial vehicle operations, vehicle safety, and other cross-cutting areas of *ITS*.
- **Stage 4** developed an econometric model, informed by the critical private sector industry survey data, tested the statistical model, and used the model to generate *ITS* industry estimates. Further analysis delineated the "End-Use Product and Services" portion of the industry.

While previous studies have examined various aspects of the *ITS* market, this is the first study to analyze the full and diverse spectrum of *ITS*, and to link the analysis of the market to 86 identified industrial sub-groups of the North American Industry Classification System (NAICS) in which *ITS* business operates.

The study further highlights the impact of *ITS* private sector employment on every state in the U.S. and small business' significant role in the *ITS* industry, with 73 percent of U.S. *ITS* revenues attributable to companies with fewer than 500 employees.

The study concludes that—in addition to the \$48 billion U.S. *ITS* end-use products and services market—the rest of North America (Canada and Mexico) contributes another \$4 billion in *ITS* revenues, for a total North American *ITS* end-use product and services market of \$52 billion.

The report offers the following observations about the U.S. and North American *ITS* industry:

- *The economic impact of the ITS industry is significant.* Modelers estimate an end-use *ITS* market of \$48 billion. The rest of North America contributes an additional \$4 billion in revenue. U.S. *ITS* market revenues exceed those for electronic computers, motion picture and video products, direct mail advertising, or internet advertising.
- *The outlook for the ITS industry is positive.* The model anticipates continuing expansion and a projected CY 2015 total U.S. private sector *ITS* market of \$67 billion and an additional \$6 billion for the rest of North America. From CY 2009 through CY 2015, U.S. private sector revenues are expected to climb between \$2.7 billion to \$4.2 billion each year, with *ITS* revenue growth exceeding average growth for the U.S. and North America.
- *ITS employment impacts every state in the U.S.*
 - For CY 2009, the econometric model estimates that 445,000, or 0.3 percent of the 138 million total jobs in the U.S., are U.S. *ITS*-related jobs and 494,000 for all of North America.
 - The U.S. end-use market contributes almost 180,000 private sector jobs (40 percent) to this total and the rest of North America an additional 20,000.
 - The *ITS* end-use market contributes more jobs to the U.S. economy than the motion picture/video production or electronic computer markets.
- *ITS jobs pay well.* Based on survey responses, average *ITS* salaries are well above the national average by more than \$32,000. Even the lowest paid occupational category of *ITS* employees earns more than 8 percent above the national average wage. More than half of the U.S. *ITS* jobs categorized by occupation had associated salaries of \$69,000 or more. Three occupations (software developer, hardware developer, and other engineering) account for 32 percent of the *ITS* jobs.
- *The employment outlook for the U.S. and North American ITS industry is positive and better than for the economy overall.*
 - By CY 2015, North American end-use *ITS* employment is projected to increase by 16 percent over CY 2009 levels and to contribute more than 231,000 jobs. During the same period, U.S. private sector end-use employment is projected to increase 14 percent.
 - For the U.S. end-use market, the model projects job gains of 0.7 percent in CY 2010 and 2 percent in CY 2011, with steadier growth of 3,600 to 6,400 jobs each year through CY 2015, when private sector end-use market *ITS* employment is projected to reach more than 205,000.
 - *ITS* companies responding to the survey were more optimistic than model projections. These specific companies reported domestic *ITS*-related employment increases of almost 15 percent from CY 2008 to CY 2009 and an expected, additional job increase of more than 13 percent in CY 2010.

- By CY 2015, the *ITS* value chain (including enabling services and components as well as end-use products and services) is projected to contribute 500,000 U.S. jobs and an additional 64,000 in the rest of North America.
- *Small businesses play a significant role in the ITS industry.*
 - According to the model, 73 percent of U.S. *ITS* revenues are attributable to companies with fewer than 500 employees.
 - Ninety-seven percent² of the companies responding to the survey that were predominantly focused on *ITS*³ and reported employment had fewer than 500 employees.
- *There is tremendous variety in ITS products.* The MDA survey and firmographics research confirm that at least 3,000 companies produce *ITS* products and services for the U.S. market; these companies in the *ITS* value chain span 86 NAICS industry sub-categories.
- *Patent statistics and survey data point to continued ITS industry growth and innovation.* Small and large companies alike apply for and are granted patents. From CY 2007 to CY 2008, when overall U.S. patent applications were static, *ITS*-related patents grew 17 percent.

² Sixty-two companies that were largely *ITS* provided employment figures. Of these, 60 had fewer than 500 employees.

³ A company is defined as “predominantly focused on *ITS*” if it reported 50 percent or more of 2009 gross revenues attributable to *ITS*.

THE MARKET DATA ANALYSIS PROJECT

In April 2009, the United States Department of Transportation (U.S. DOT) Research and Innovative Technology Administration (RITA) commissioned the Intelligent Transportation Society of America (ITS America) to conduct a two-phase study of Intelligent Transportation Systems (*ITS*) to develop accurate and comprehensive estimates of the breadth and size of the U.S. and North American *ITS* markets, including enabling services and major component suppliers. Supporting research to advance the *ITS* industry, U.S. DOT RITA commissioned this supply-side study to better understand the scope, scale, and growth projections within the private sector, where service offerings, scale, visibility, and use by consumers and public agencies—particularly state and local government agencies—is growing. The study is based on a private sector survey of companies and extensive econometric modeling.

Intelligent Transportation Systems are what make transportation smarter. They include the use of electronics, communications, and information processing technology to improve all aspects of transportation and include diverse applications. The overall Market Data Analysis (MDA) study goal was to produce and maintain a robust, comprehensive, and current database and report on private sector industry trends relating to *ITS* revenue and employment across the full spectrum of the *ITS* market. The definition of *ITS* used in this study is therefore purposefully broader and more extensive than adopted for other *ITS* market studies.

The study divides the National *ITS* Architecture into nine market sectors. Table 1 provides specific examples of *ITS* products and services in each category.

Table 1: National ITS Architecture Products & Services

| | | |
|--|---|---|
| <p>Traffic Management Market Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Freeway & Arterial management systems 2. Active Traffic Management Systems 3. Traffic Decision Support & Demand Management Systems 4. Traffic Management Roadside Hardware / Software 5. Traffic Incident Management Equipment / Systems 6. Roadway Weather Information Systems (RWIS) 7. Traffic Detectors / Surveillance Equipment 8. Traffic Probes 9. Signaling and Control Devices 10. Intersection Cabinet Safety Devices / Components 11. Battery Backup / Uninterruptible Power Supply systems 12. Roadway Closure Equipment / Systems 13. Dynamic Message Signs (DMS) 14. Electronic Toll Collection Equipment / Systems 15. Electrical Lighting & Management Systems 16. Drawbridge Management 17. Emissions Monitoring Equipment / Systems 18. Speed Monitoring Equipment / Systems 19. Variable Speed Controls 20. HOV Lane Management Equipment 21. Mainline Lane Controls 22. Reversible Lane Management Equipment / Systems 23. Metering 24. Regional Parking Management Equipment / Systems 25. Parking Facility Management Equipment / Systems 26. Asset Management Systems | <p>Public Transportation Market Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. <i>ITS</i> Archived Data / Business Intelligence Systems 2. Voice / Data Communications Systems 3. Computer-Assisted Dispatch (CAD) Systems 4. Automatic Vehicle Location (AVL) System for Buses 5. Automated Train Location System (ATLS) for Rail Transit 6. Transit Signal Priority (TSP) Systems 7. Connection Protection / Notification Systems 8. Positive Train Control 9. Automated Vehicle Monitoring (AVM) 10. Automatic Passenger Counting (APC) System 11. Transit Travel Information (TTI) Systems 12. Advanced Fare Collection / Electronic Payment Systems 13. Security Systems 14. Demand-Responsive Transit | <p>Emergency Management Market Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Early Warning System Alert & Advisory Systems 2. Emergency Call-Taking & Dispatch Services 3. Emergency Routing Equipment Systems 4. Emergency Signal Preemption 5. Transportation Infrastructure Protection Systems 6. Roadway Service Patrols 7. Mayday & Alarms Support Systems/Equipment 8. Wide-Area Alert Systems 9. Disaster Response & Recovery Equipment / Systems 10. Disaster Traveler Information Systems / Software 11. Evacuation & Reentry Management Systems / Software 12. Telemedicine Applications / Systems |
| <p>Cross-Cutting & Other ITS Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Communications 2. Systems Integration 3. Systems Engineering | <p>Commercial Vehicle Operations Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Back Room Systems 2. Driver Management Systems 3. Driver Communication Systems 4. Vehicle Monitoring & Management Systems 5. Cargo Management Systems 6. Safety Management Systems 7. Driver Credentialing Systems 8. Other Systems and Technologies | <p>Maintenance & Construction Mgmt — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Vehicle & Equipment Tracking Systems 2. Environmental / Meteorological Sensors, including Clarus 3. Hazard detection / updating / advisories 4. Monitors, forecasts, schedules, manages activities 5. Scheduling, coordination / on-board sensors, diagnostic 6. CCTV traffic monitoring & control / DMS / ISP / HAR 7. Rain / sun sensors, vehicle monitoring, probe data 8. Fixed & vehicle-based sensors / probe monitoring |
| <p>Archived Data Management Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. <i>ITS</i> Data Collection & Management 2. <i>ITS</i> Data Warehouses | <p>Vehicle Safety Market Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Automated Vehicle Systems 2. Cooperative Vehicle Safety Systems 3. Vehicle Safety Monitoring and Assistance Systems 4. Driver Safety Monitoring Equipment/Systems 5. Operator Assistance Systems 6. Collision Notification Systems | <p>Traveler Information Market Sector — <i>ITS</i> examples:</p> <ol style="list-style-type: none"> 1. Vehicle Telematics 2. Transportation Data for Vehicle Operators 3. Vehicle-to-Vehicle Traveler Information 4. Broadcast Traveler Information 5. Interactive Traveler Information 6. ISP Based Trip Planning and Route Guidance 7. Autonomous Route Guidance 8. Dynamic Route Guidance 9. Dynamic In-Vehicle Signing 10. Static In-Vehicle Signing 11. Yellow Pages and Reservations Services |

STUDY RESULTS IN BRIEF

The end result of this study is a detailed estimate of the size of the U.S. and North American *ITS* markets and employment. The study is a supply-side exercise that predicts the dollar value contribution of each of the many companies in the quickly evolving *ITS* market—a market that spans numerous industries. Like any modeling exercise, the precision of predicted values is subject to model assumptions, accuracy of survey responses, and the sample size. Modelers used U.S. industry outputs as benchmarks and as the basis for post-modeling adjustments; this process was designed and expected to enhance the accuracy of modeling estimates.

Based on the research of ITS America and its partner, IHS Global Insight, the study identified and validated 3,000 U.S. companies operating in *ITS* and total company revenues for each. The study then focused in on the less than three percent of these revenues attributable to *ITS* and estimates Calendar Year (CY) 2009 U.S. *ITS* revenues of \$48 billion for end-use *ITS* manufacturing products and services for these companies.

The report also identifies the revenues generated by the constituent parts of the *ITS* value chain, including \$47 billion in *ITS*-enabling service revenue that is not end-use. These critical enabling services, which make *ITS* possible, include wired and wireless communications, systems integration, and architectural, engineering, drafting, and consulting services. The study also identified \$17 billion in *ITS* component product revenue.

The study concludes that—in addition to the \$48 billion U.S. *ITS* end-use products and services market—the rest of North America (Canada and Mexico) contributes another \$4 billion in *ITS* revenues, for a total North American end-use *ITS* market of \$52 billion.

The research also attributes almost 180,000 private sector U.S. jobs to the end-use *ITS* industry. MDA projections for the U.S. *ITS* end-use industry are for continuing growth, with CY 2015 projected total revenue increasing by almost 41 percent (over CY 2009) and end-use private sector employment of almost 205,000. Providers of *ITS* enabling services and components are projected to contribute an additional 295,000 private sector U.S. jobs.

STUDY BACKGROUND

In Phase 1 of the MDA, ITS America researchers tested their methodology by reaching out via electronic surveys to 200 *ITS* companies in a limited number of sectors and to two states. This pilot effort culminated in December 2009 with the issuance of a White Paper summarizing the results from the two states and 53 companies responding with meaningful *ITS* data.⁴

In Phase 2, ITS America researchers sought and received feedback on the pilot from (1) U.S. DOT, (2) survey experts from the Joint Program in Survey Methodology at the University of Maryland and the

⁴ Available at: [http://www.itsa.org/itsa/files/pdf/Market_Data_Analysis_Project_-_Phase_1_Report_\(Final\).pdf](http://www.itsa.org/itsa/files/pdf/Market_Data_Analysis_Project_-_Phase_1_Report_(Final).pdf)

University of Michigan, and (3) a Technical Expert Group (TEG) created for this project. [See Appendix A for brief biographies of the TEG and the project staff.] Based on this feedback and analysis of the information provided during Phase 1 and a U.S. DOT decision to concentrate on a supply-side based market estimate, MDA researchers focused Phase 2 on eliciting data from a broader universe of North American *ITS* companies and major component suppliers via a revised and shortened private sector survey. This was supplemented by extensive research relating to the specifically identified *ITS* companies and econometric modeling of the *ITS* market.

How is this market estimate different from previous and lower market estimates?

Prior efforts to size the *ITS* market, catalogued in Appendix B, typically looked at a limited selection of the most obvious *ITS* products and companies or relied on-demand analysis of state *ITS* budgets to derive an *ITS* market estimate. The end results of these more than 20 narrowly focused efforts, dating from the 1990's to the present day, were substantially smaller market size estimates. This private sector industry study differed in the following ways from previous efforts, which only captured and estimated the tip of the *ITS* iceberg. This supply-side study:

- Was grounded in the U.S. DOT's National *ITS* Architecture, updated and vetted by industry experts to ensure inclusion of the current full range of private sector *ITS* products and services;
- Looked beyond the surface to identify, verify, and include, as appropriate, in the *ITS* market:
 - Industries engaged in direct production of *ITS* equipment;
 - Major manufacturers of intermediate products or components;
 - *ITS* service industries; and
 - Wholesalers of *ITS*-related auto parts/supplies, computers, electrical/electronic appliances.
- Surveyed key market players, using a tested survey instrument, to gain information critical to establishment of a market model;
- Paired industry expertise with econometric modeling expertise to ensure a credible methodology and model;
- Used four core data sources to initially identify over 15,000 entities potentially engaged in *ITS*, as defined by the National *ITS* Architecture;
- Employed multiple research techniques, proprietary and governmental data bases with company-specific information, and data triangulation to filter the list down to 3,000 current *ITS* companies with more than 40,000 establishments or company locations; and

- Identified and verified the relevance of 86 North American Industrial Classification codes to the *ITS* industry and used related, detailed data to meticulously evaluate, for each company location, revenue and employment attributable to *ITS*—a process particularly challenging for larger, more diverse companies.

ROADMAP TO THE REPORT

This report further explains the study's unique approach and summarizes the analysis and resultant market estimate based on an industry survey and econometric modeling. The report: (1) describes the four stages of the study; and (2) provides answers to a series of questions about the *ITS* industry—conveying what researchers learned from their primary research and concluded from their models.

This second phase of the MDA had four main stages:

- Stage 1: Understanding and Defining Products and Services in the *ITS* Universe
- Stage 2: Identifying Companies in the North American *ITS* Market
- Stage 3: Collecting Primary Data from Identified Companies: The Industry Survey
- Stage 4: Modeling the North American *ITS* Market

The report also contains the following Appendixes:

- Appendix A: Technical Expert Group (TEG) and ITS America Research Staff
- Appendix B: Summary of *ITS* Study Literature Review
- Appendix C: *ITS* Products and Services (derived from the National *ITS* Architecture)
- Appendix D: Industry Survey
- Appendix E: Industry Survey Methodology and Detailed Results
- Appendix F: Modeling and Estimation Methodology
- Appendix G: *ITS* Target Industry List and *ITS* Companies
- Appendix H: Additional *ITS* Industry Information Derived from the Model

STAGE 1: UNDERSTANDING AND DEFINING PRODUCTS AND SERVICES IN THE *ITS* UNIVERSE

The use of smart technologies (including electronics, communications, and information processing technology) to improve all aspects of transportation is now commonly referred to as Intelligent Transportation Systems or *ITS*.

To accurately size the *ITS* market, ITS America researchers needed to ensure a consistent understanding of the products and services in the *ITS* universe. The most logical point of departure was the existing National *ITS* Architecture, created by U.S. DOT in the mid-1990's to provide a common structure for *ITS* design. The National *ITS* Architecture includes eight categories of market or equipment packages. The research team condensed the more than 20 pages of narrative into a matrix, updated the nomenclature to reflect the most recent technological advances, and reoriented the listing to focus on examples of *ITS* products and services rather than on design and deployment. The

researchers vetted the product/service listing with the TEG, the American Association of State and Highway Transportation Officials (AASHTO), the Commercial Vehicle Safety Alliance (CVSA), and experts in emergency management, transit, and the National *ITS* Architecture itself.

This listing of *ITS* products and services is embedded in the survey via a hyperlink and is included as Appendix C. It enabled respondents to verify, in a consistent manner, that their company was active in *ITS* and in which market segments. To capture companies involved in cross-cutting *ITS* arenas, such as system integration and telecommunications, the researchers added a ninth category, designated as “Other/Cross-Cutting *ITS*.” This setting of industry parameters and categorization of current examples were the foundation for the study and for the econometric modeling.

STAGE 2: IDENTIFYING COMPANIES IN THE NORTH AMERICAN *ITS* MARKET

With the primary goal of credibly estimating the North American *ITS* market and related private sector employment, ITS America used industry data bases, international listings of *ITS* companies,⁵ *ITS* exhibitor listings, and extensive internet and report research to compile a listing of more than 30,000 contacts and 15,000 potential *ITS*-related companies.⁶ Removing public entities, duplicates, companies clearly outside the realm of *ITS*, obvious subsidiaries, and those no longer in business resulted in an initial list of 8,976 companies believed to produce *ITS* products or provide *ITS* services in North America. The *ITS* universe included manufacturers, system integrators, engineers, contractors, suppliers, consultants, distributors/resellers of *ITS*-related products, and installers.

ITS America researchers used the listing developed in Stage 1 to identify and preliminarily screen these companies and identified personal survey contacts and email addresses for almost 40 percent (3,568). These companies became the target of the survey and provided critical input for the model developed in Stage 4.

STAGE 3: COLLECTING PRIMARY DATA FROM IDENTIFIED COMPANIES: THE INDUSTRY SURVEY

On March 31, 2010, ITS America researchers sent the revised survey electronically to 3,568 private sector companies and kept the survey open through April 26, 2010. The survey included a hyperlink to the list of products/services developed in Stage 1. (See Appendix D for a copy of the industry survey.)

Based on pilot feedback and recognizing the sensitivity of the information requested, the survey included a formal non-disclosure commitment to all respondents. This commitment included a pledge

⁵ Researchers included international listings where there was a possibility of North American market involvement and relied on subsequent screening and the survey to identify and filter out those companies without a North American *ITS* presence or employees.

⁶ Sources for the initial list of companies/contacts included ITS America’s Customer Relations Management database (approximately 36,000 contacts in 12,466 companies); ITS America’s Industry Source database (1,369 companies); ITS International (1,347 companies); and other sources, including newsletters, publications, exhibitor lists, etc. (118 companies).

of confidentiality. It further explained that researchers would retain company information only with randomly assigned tags, present the responses in the aggregate, and not associate responses to any questions with individual companies.

To whom was the survey sent and who responded?

Researchers sent the industry survey to companies for which they could identify an email contact. This constituted roughly 40 percent of potential North American *ITS* companies identified. About 19 percent (693) were returned with bad email addresses or incorrect contact points.

Companies could easily compare their products and services against specific *ITS* categories and examples. About 2 percent (67) of the responding companies stated that their companies were not active in the *ITS* market; 10.5 percent (295) of the remaining 2,808 companies responded to the survey in whole or in part.⁷

Table 2 provides a breakdown of the number of *ITS* companies on the initial contact list, the number of companies ultimately sent the survey, and the response rate.

⁷ For large sample size surveys, economic modelers consider a response rate of 5 to 6 percent sufficient to construct a credible model. The MDA response rate, which was over 10 percent, provided a robust foundation for the industry estimate.

Table 2: Companies Sent the Survey⁸ and Response Rate

| | Number of Companies |
|--|----------------------------|
| Companies Identified after initial filter | 8,976 |
| - Unable to identify contact email address | 5,408 |
| = <i>Number of companies identified with email addresses</i> | <i>3,568</i> |
| - Invalid email addresses | 693 |
| = <i>Total Surveys Delivered</i> | <i>2,875</i> |
| - Companies indicating that they were not involved in <i>ITS</i> | 67 |
| = <i>Potential Respondents</i> | <i>2,808</i> |
| Number of <i>ITS</i> Companies Providing <i>ITS</i> Information | 295 (10.5%) |

See Appendix E for survey methodology and a detailed accounting and analysis of survey results.

Were survey respondents representative of the *ITS* universe?

No. Companies willing to respond and share sensitive information were more likely to be more fully engaged in the industry, perhaps more optimistic about its prospects, and, given their limited number, not necessarily representative of every *ITS*-related industrial sector. Many of the survey respondents were smaller companies and service providers. While the survey generated responses from companies in each of the nine market package areas, companies engaged in traffic management were most likely to provide data.⁹

The econometric model was developed to address these variations.

⁸ Consistent with the privacy precepts of survey methodology and to protect the sensitive business information which respondents shared with us, this report does not identify the names of companies responding to the survey.

⁹ See Appendix E, Table E-1, for a detailed analysis of the *ITS* products and services provided by company respondents in each of the *ITS* market segments.

Did the survey skew the ultimate market estimate?

No. While the survey was foundational in the establishment of the econometric model, survey results did not skew the market estimate. The survey results were not directly extrapolated in the determination of the size of the entire *ITS* industry. Rather, researchers developed the model to address these limitations and used qualitative inputs based on secondary research to compensate for any survey over-estimation. For example, the estimation model considered such factors as: (1) firm size (total revenue or employment); (2) high technology purchase intensity¹⁰; (3) transportation end-use market penetration; and (4) share of high-technology employees.

The models, which have the benefit of wider research, firmographics data from proprietary data bases, economic forecasting, and tested modeling methodologies, are, by design, broader and more conservative in their projections. Researchers also calibrated¹¹ the model to ensure the validity of predicted values and made post-modeling adjustments. Knowledge of U.S. industry subgroup market activity helped to mitigate any measurement errors.

This is standard practice in modeling and estimation of markets. The modeling and estimation process are described more fully in Stage 4.

STAGE 4: MODELING THE NORTH AMERICAN *ITS* MARKET

In Stage 4, MDA researchers worked with private sector econometric experts to: (1) establish a list of North American Industry Classification System (NAICS) codes related to *ITS* as a basis for market estimation; (2) access proprietary and governmental data bases to verify information on identifiable *ITS* companies to isolate *ITS* revenues and employment by company location and determine those revenues not attributable to *ITS*; (3) develop econometric models, informed by the industry surveys, to estimate and forecast the direct contribution of the North American *ITS* industry to the economy; and (4) identify the end-use products and services portion of the overall *ITS* value chain.

Concurrent with Stage 3, the research experts took the list of 8,976 companies developed in Stage 2 and cross-matched information to: (1) remove foreign legal entities without North American *ITS* operations and/or North American employees; (2) delete companies no longer in existence; and (3)

¹⁰ *ITS* manufacturing companies typically purchase a significant share of electronic hardware components or employ high technology services in their production processes and do so to a greater extent than other industries with a similar level of output. Modelers can measure these industry specific characteristics and factor them into the revenue estimation process.

¹¹ The model was calibrated via two different angles. First, modelers evaluated the model in sample estimates relative to actual levels of survey data, and, where the error term exhibited a large deviation, the industry and size class of the enterprise were recorded for review in the universe simulation. Secondly, modelers used post-simulation examination; they compared market size estimates by industry (for revenue and employment) to total market estimates of revenue and employment to detected anomalies. Less than 2 percent showed unreasonable share and were scaled to line up to similar adjacent industries.

ensure the most up-to-date legal company name and establishment location(s). This list of targeted companies—minus those that could not be verified—became the focus of in-depth research, primarily seeking matching revenue, employment, and other company-specific information, or “firmographics,”¹² for input into the model.¹³ In the end, 2,787 companies were included in both the MDA survey invitation list and the modelers' lists, with triangulated data from firmographic research, NAICS code analysis, and governmental and proprietary databases adding some 211 companies to the ultimate *ITS* universe of 2,998 companies.

Modelers estimated the share of revenue generated by *ITS* for each establishment using data from Industry Survey respondents and indirect input from industry sectors. They linked the following explanatory variables to model observations:

- Firm size indicator, defined as a firm’s total revenue;
- Purchase intensity factor, defined as share of high technology goods and services purchases;
- Surface transportation end-use market index, defined as share of sales to the surface transportation industry; and
- Degree of technical professionals employed, defined as the share of high technology professionals to total employment.¹⁴

Based on this process, econometric modelers estimated the direct economic contributions of North American *ITS*-related industries.¹⁵ They estimated North American *ITS* market revenues in three segments: (1) U.S. motor vehicle manufacturing *ITS* revenues; (2) other U.S. *ITS* revenues; and (3) *ITS*

¹² Firmographic information includes a company’s hierarchical structure in organizational perspective, total revenue and employment, the location of each establishment within the company, revenue and employment by location, and changes in this data over time.

¹³ The initial effort to identify the 8,976 companies produced roughly 1,000 matches, with inconsistencies in geographic locations and naming conventions and changes in company ownership presenting a challenge. Modelers therefore focused their efforts on the 3,568 companies for whom MDA researchers had personal email contacts. Ultimately, the modelers were able to find matches and related firmographics information for some 3,799 companies; 2,787 of these companies were included in both the MDA survey and modelers’ lists.

¹⁴ In addition to survey data and company-specific firmographics data, modelers used Bureau of Economic Analysis input/output tables and data from the Bureau of Labor Statistics as input to the model.

¹⁵ The econometric model aims to understand the relationship between the *ITS* revenue contribution and some firm and industry specific characteristics. Once this relationship is established, using the knowledge gained from survey responses, the extent of revenue contribution from companies not responding to the survey but believed to contribute to the *ITS* products and services universe can be deduced. The model included survey results to the extent possible (i.e. size contribution and related occupation information) and enhanced the relationship by using industry specific characteristics, such as intensity of technology usage and end-use market attributes.

revenues in the rest of North America. Using the survey occupational and salary data from both this survey and the earlier pilot study, augmented by secondary research, detailed firmographics information, and published and customized datasets, the econometric modelers also estimated North American *ITS* employment and U.S. *ITS* employment as a subset.

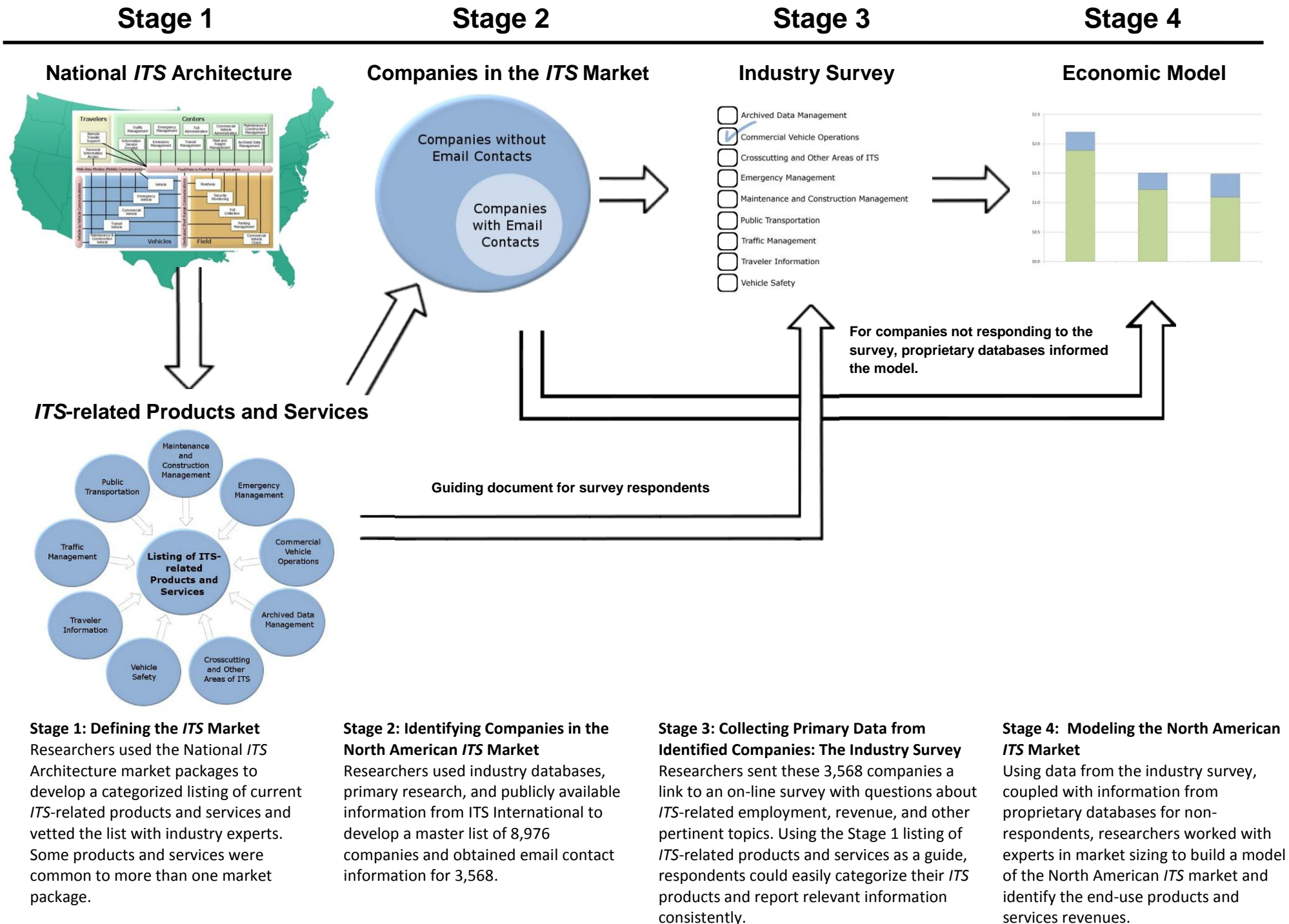
The modelers also used a commercially available model, based in part on input-output data,¹⁶ to measure the *ITS* industry's revenue and labor income. This model traces supply and demand for all products and services, including the relationships between industry sub-groups and changes in final demand for the product/service.¹⁷ (See Appendix F for a more detailed description of the modeling and estimation methodology.)

Figure 1 depicts the four-staged process used to size the North American *ITS* market in the MDA.

¹⁶ Input-output data depicts the interrelationships of various industries in an economy. They show how the output of one industry is an input to other industries.

¹⁷ The model used in this study to evaluate indirect and induced impact of the *ITS* industry in the U.S. and Canada was the "Impact Analysis for Planning," or IMPLAN model. Estimates for Mexico were derived using the IHS Global Insight's World Industry Service.

Figure 1: A Four-Stage Process to Size the North American ITS Market



ANSWERS TO QUESTIONS ABOUT THE U.S. AND NORTH AMERICAN *ITS* INDUSTRY

This section of the report provides answers to a series of questions about the *ITS* industry. The answers come from the following sources:

- The econometric estimations, to provide the broadest scope possible for areas informed by the model;
- The MDA industry survey, for areas not covered by the model; or
- From both the econometric estimations and the survey, if available results appear to be inconsistent.

In this last scenario, the report describes the variation and discusses possible causations. Some of these inconsistencies may be due to the small, non-random survey sample and the response rate of companies with a more predominant *ITS* focus. Respondents to the industry survey are, by virtue of their response, more likely to be focused on the industry and optimistic about its future. The models, which have the benefit of wider-research, firmographics data from proprietary data bases, economic forecasting, and tested, sophisticated economic modeling methodologies, are, by design, broader and more conservative in their projections.¹⁸

The questions are grouped into the following categories:

- *ITS* company characteristics;
- *ITS* revenues;
- *ITS* employment; and
- *ITS* innovation.

***ITS* COMPANY CHARACTERISTICS**

How did modelers determine the industries related to *ITS*?

The industry determination relied on three major reference points:

- The National *ITS* Architecture lists of products and services;
- Survey respondent self-identification of company primary industry; and
- Firmographics data.

¹⁸ The margin of error for model-based estimations in this study is minus 10 percent to plus 8 percent, at a confidence level of 90 percent. The confidence interval is unevenly distributed because it is the average of intervals for each of the observations used in the model.

The industry survey asked respondents to identify their primary industry affiliation from among a list of 29 selected three-digit North American Industry Classification System (NAICS) codes. ITS America researchers identified these industry groupings by referencing the National *ITS* Architecture-derived lists of products and services developed in Stage 1. The list of companies included:

1. Industries engaged in direct production of *ITS* equipment;
2. Major manufacturers of intermediate products or components;
3. *ITS* service industries related to transportation, construction, engineering, telecommunications, consulting, computer programming, and research and development activities; and
4. Wholesalers of automobile parts and supplies, computers, and electrical and electronic appliances.

The modelers used this initial list of selected industry groupings and refined it through triangulation of data to include only industry subsets more directly relating to *ITS* impact and *ITS* major suppliers. The modelers:

- Examined the primary three-digit NAICS codes reported by survey respondents;
- Expanded¹⁹ the list of these selected three-digit NAICS codes to the more granular six-digit NAICS codes using firmographics databases, such as the National Establishment Time Series (NETS) 2008 database²⁰ and Hoovers Analytics;
- Examined in detail the six-digit NAICS codes of all locations of major *ITS* players using the firmographics database and deleting the most obvious non-related industries;
- Obtained a “union” of the final set of six-digit NAICS codes from the survey and from selected industries of major *ITS* players;
- Compared this expanded list of six-digit NAICS codes to the National *ITS* Architecture-derived list of *ITS* products and services;
- Removed from the list of targeted industries those which appeared to be too broad, too indirect, or inaccurate when cross-checked with the list of *ITS* products and services;²¹ and

¹⁹ Modelers added the following NAICS codes included as industry options on the survey but not selected by survey respondents: 333, Machinery Manufacturing; 423, Merchant Wholesalers, Durable Goods; 561, Administrative and Support Services; and 811, Repair and Maintenance. Modelers also added NAICS code 561 Administrative and Support Services not originally included in the survey options but determined to be *ITS* relevant to some target companies.

²⁰ NETS provides a primary NAICS code for active establishments of companies.

²¹ Modelers removed the following 3-digit NAICS codes initially included as options for survey respondents: 482, Rail Transportation; 484, Truck Transportation; 485, Transit and Ground Passenger Transportation; 511, Publishing Industries (except Internet); and 532, Rental and Leasing Services. As modelers integrated NETS data

- Concluded that approximately 3,000 companies operate in the *ITS* space in 15 three-digit NAICS codes and 86 six-digit NAICS sub-groups.²²

In what industries are *ITS* companies engaged and to what extent?

The *ITS* value chain spans 15 major industry groupings, including 86 NAICS sub-categories. *ITS* companies that provide end-use products and services are engaged in 61 of the NAICS sub-categories; intermediate or enabling *ITS* services and *ITS* component companies span an additional 25 NAICS sub-categories.

Modelers estimated the *ITS* portion of revenue/output for these groupings by:

- Using survey-derived econometric models, firmographics data, and other explanatory variables²³ for each location of the target companies to estimate what share of each company's revenue was generated by *ITS*;²⁴
- Aggregating the *ITS* revenue estimates of the six-digit NAICS codes into the larger three-digit NAICS codes;
- Determining the total revenue (output) of each of the six-digit NAICS codes using government-published data and aggregating to three-digit industry groupings; and
- Computing the share of *ITS* revenue to total output by three-digit NAICS codes.

Table 3 shows the end result of this analysis: 15 industry groupings (by 3-digit NAICS code) used in the model and the portion of each industry in the U.S. attributable to end-use *ITS* products and services in

with the universe of *ITS*-related companies, they found 40,402 active *ITS*-related establishments, grouped within 86 six-digit NAICS codes. In examining parent/subsidiary relationships, modelers removed NAICS codes for numerous establishments of diverse parent companies when those establishments were found NOT to be engaged in businesses directly related to *ITS*.

²² In the NAICS classification system, there are a total of 1,173 six-digit codes. Within the 15 three-digit codes applicable to *ITS*, there are a total of 339 six-digit codes. Only 86 of these six-digit codes were deemed relevant to the *ITS* market estimation.

²³ For input, modelers used such firm-specific variables as size; location; nature of business; total revenues; years since *ITS* product development; extent to which the industry supplies products or services to the surface transportation end market; and proportion of skilled professionals in occupations such as computer science, mathematics, or engineering. They looked at this specific information in the context of the state of the economy, industry size and geographic concentrations in specific regions or states, proximity to supplier industries, research institutions, and human capital.

²⁴ Based on various explanatory variables (including industry and firm characteristics), a location's share of *ITS* revenue contribution could range from 0 to 100 percent.

CY 2009.²⁵ Of these industries, Computer and Electronic Product Manufacturing (NAICS 334) and Data Processing, Hosting, and Related Services (NAICS 518) had the largest portions of output attributable to *ITS*, each with under 4 percent; Transportation Equipment Manufacturing ranked third, with just over 1 percent.

Table 3: Percentage of U.S. Industry Output Attributable to *ITS* (CY 2009)

| NAICS Title (3-digit code) | Percentage of Total Industry Output |
|--|-------------------------------------|
| Computer and Electronic Product Manufacturing | 3.94% |
| Data Processing, Hosting and Related Services | 3.62% |
| Transportation Equipment Manufacturing | 1.04% |
| Heavy and Civil Engineering Construction | 0.98% |
| Support Activities for Transportation | 0.98% |
| Telecommunications | 0.93% |
| Professional, Scientific, and Technical Services | 0.73% |
| Repair and Maintenance | 0.44% |
| Electrical Equipment, Appliance, and Component Manufacturing | 0.30% |
| Broadcasting (except Internet) | 0.29% |
| Specialty Trade Contractors | 0.29% |
| Merchant Wholesalers, Durable Goods | 0.21% |
| Miscellaneous Manufacturing | 0.19% |
| Machinery Manufacturing | 0.12% |
| Administrative and Support Services | 0.07% |

See Appendix G for a detailed breakdown of the broader industry categories into 86 *ITS* target industry sub-groups based on six-digit NAICS codes. See Appendix H for other detailed tables presenting analyses of *ITS* industry revenues and employment by state and industry codes.

²⁵ The model does not provide employment and revenue projections for Canada and Mexico by NAICS code because the linkage between such data is limited for companies outside of the U.S. Modelers used a combination of their World Industry Service database and the IMPLAN model to derive non-domestic estimates.

How many company locations were identified as engaged in *ITS*?

The study validated that 40,402 U.S. company locations were engaged in *ITS*-related work.

The 3,799 companies believed to be engaged in *ITS*-related work had a total of 188,976 locations²⁶ or establishments. Researchers re-examined all of these locations for relevance to the 86 *ITS*-associated NAICS codes. As a result, they removed some 800 companies in their entirety as well as locations of other companies as not verifiably *ITS*, removed 79 percent (148,574 locations), and validated the remaining 21 percent of locations as engaged in *ITS*-related work.

***ITS*-RELATED REVENUES**

What are total North American *ITS*-related end-use products and services revenues?

The modelers estimate CY 2009 North American *ITS*-related end-use products and services revenue of \$52 billion: \$48 billion for the approximately 3,000 U.S. companies identified as *ITS*-related (including \$4.25 billion for U.S. motor vehicle manufacturing), plus \$4 billion in revenues for the remainder of North America. This total revenue represents a decrease of 2.5 percent (\$1.3 billion) from CY 2008 levels.

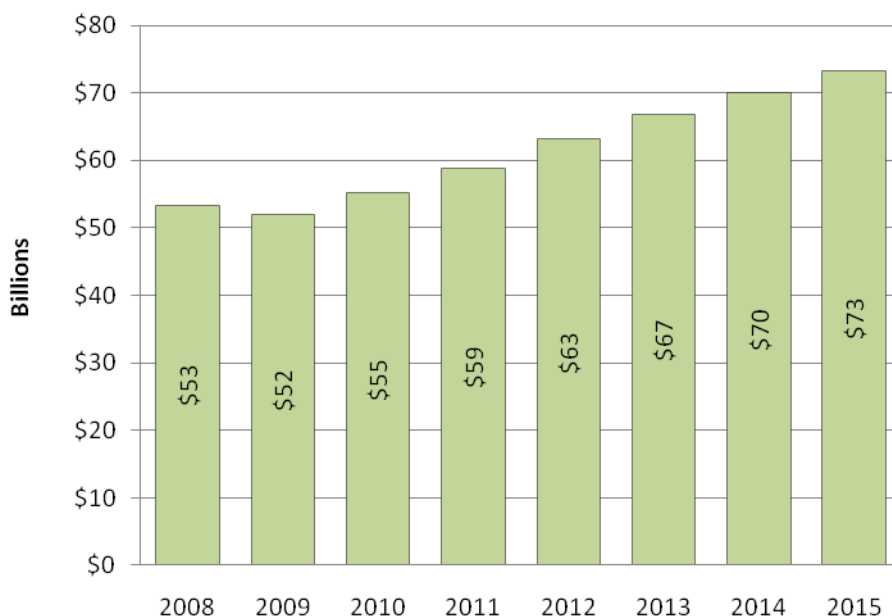
As a point of comparison, a study conducted on behalf of U.S. DOT in 1997, used a more subjective analysis based on the cost of full infrastructure deployment and subsequent privately-led *ITS* market growth to project a roughly \$35 billion U.S. *ITS* market in 2010.²⁷

Figure 2 shows a recovery from the global recession and domestic economic slowdown, with model projections of steadily rising *ITS* revenue for 2010-2015.

²⁶ The large number of company locations is in part attributable to the prevalence of retail establishments associated with some industry groups, such as telecommunications companies, and name changes due to mergers and acquisitions during the last decade's dramatic evolution.

²⁷ Note that this projection was based on the assumption of full *ITS* deployment by 2005. See Apogee Research, Inc. and ITS America, *ITS National Investment and Market Analysis*, May 1997, p. ii and p.iv.

Figure 2: North American ITS End-Use Revenues (in billions of USD)



The estimation model considered such factors as: (1) firm size (total revenue or employment); (2) high technology purchase intensity²⁸; (3) transportation end-use market penetration; and (4) share of high-technology employees.

What percentage of total company revenues is attributable to ITS?

The approximately 3,000 ITS-related companies had CY 2009 total U.S. revenues of \$1,706 billion. U.S. ITS end-use revenues represent less than 3 percent of total revenues for these companies.

What are the various elements of the U.S. ITS value chain?

Modelers analyzed the ITS value chain and see the market in three segments:

- *End-use products and services*: 43 percent (\$48 billion)-derived by using Bureau of Economic Analysis input-output tables, which provide, for each six-digit manufacturing NAICS code, the percentage of end-use products and purchase of services by the end-use market; examples of end-use ITS products and services include those directly related to automobiles; computer systems design services; radio and television broadcasting and wireless communications equipment; electronic computers; telephone apparatus; highway, street, and bridge construction; computer peripheral equipment; audio and video equipment; and computer storage devices.

²⁸ ITS manufacturing companies typically purchase a significant share of electronic hardware components or employ high technology services in their production processes and do so to a greater extent than other industries with a similar level of output. Modelers can measure these industry specific characteristics and factor them into the revenue estimation process.

- *Components*: 15 percent (\$17 billion); and
- *ITS Enabling Services* (including but not limited to intermediate services, e.g. wired and wireless communications, systems integration, and architectural, engineering, drafting, and consulting services critical to *ITS*, but not final-use): the remaining 42 percent (\$47 billion).

Table 4 depicts this analysis of the U.S. *ITS* value chain. See Appendix H, Table H-6 for the underlying NAICS code analysis.

Table 4: U.S. *ITS* End Use Revenue by Segment (in billions)

| End-Use Products and Services | Components | <i>ITS</i> Enabling Services |
|--------------------------------------|-------------------|-------------------------------------|
| \$47.89 | \$17.03 | \$46.92 |

How did modelers estimate end-use *ITS* services?

Among the 86 industry sub-groups that contribute to the *ITS* market there are 30 industry sub-groups providing intermediate "enabling services." These services permeate most industries in the economy, including the *ITS*-related industries. Most of these services are also purchased to some degree by final demand segments of the economy. A portion of the estimated *ITS*-enabling services are purchased by end-users of *ITS* products and services. These end-users include:

- State and local government passenger transit;
- Other state and local government consumption;
- Federal government (non-defense consumption expenditures);
- Truck transportation;
- Transit and ground passenger transportation;
- Rail transportation;
- Scenic and sightseeing transportation and support activities for transportation; and
- Couriers and messengers.

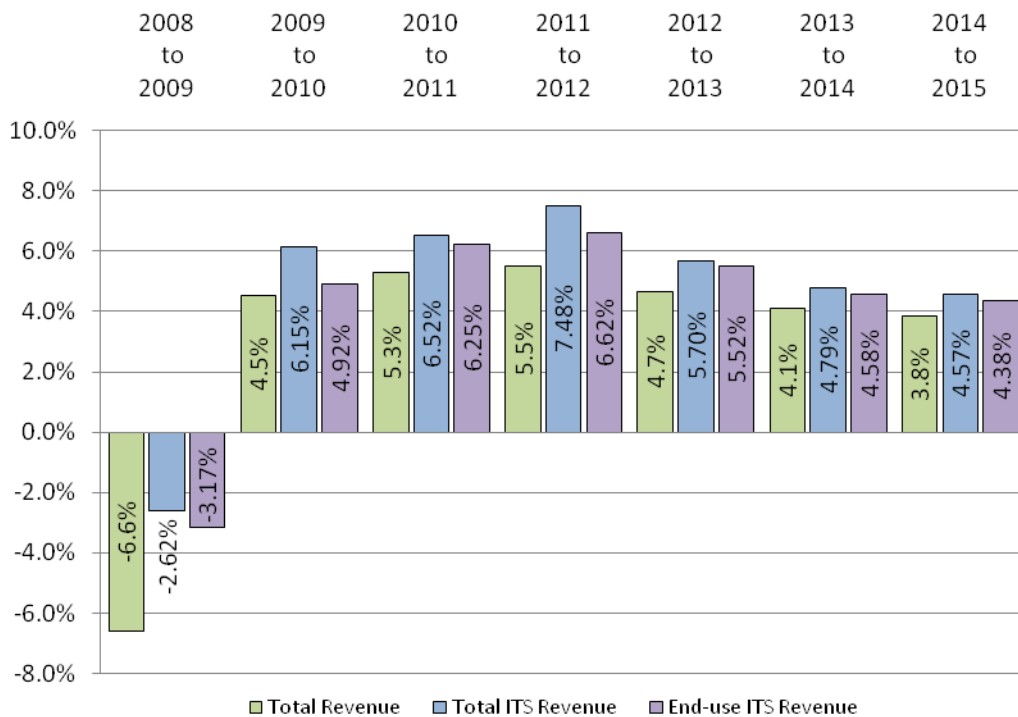
Modelers used Bureau of Economic Analysis input/output tables, which provide data on all transactions (supplier and purchaser) among industrial sub-categories, and a weighted analysis of purchases of *ITS*-enabling services by companies that produce *ITS* end-use products/services, to derive the end-use services estimate. Based on this analysis, econometric modelers estimate that at least 31.8 percent of all *ITS* services are end-use services delivered directly to businesses, state/local/federal government, and transit providers. The remaining 68.2 percent of *ITS* services are classified as *ITS* enabling services. See Appendix H, Table H-6 for a detailed analysis of each NAICS code in the *ITS* value

chain and the revenues associated for end-use products and services; enabling services; and components.

How does the growth rate for end-use *ITS* products and services compare to the overall growth rate in North America?

In CY 2009, the growth rate for the nation, for the *ITS* industry as whole, and for the manufacturing-predominated end-use sector declined. The model projects *ITS* end-use revenue increases of \$2.7 billion to \$4.2 billion or 4.6 percent to 7.8 percent each year through CY 2015. This rate exceeds average growth rates for all industries in the U.S. and North America. Figure 3 depicts this relationship for the period from CY 2008 through CY 2015.

Figure 3: Growth Rate of North American *ITS* Market Compared to the Total Economy (CY 2008 – CY 2015)



What portion of *ITS* revenues is attributable to U.S. motor vehicle manufacturing?

Modelers project a total contribution of \$4.25 billion from U.S. motor vehicle manufacturing.²⁹ This contribution is from end-use products and services and includes:

- A 2008 \$2.4 billion revenue contribution by the motor vehicle manufacturers, including mark-up on *ITS* products purchased and installed in vehicles;
- An additional 2008 \$1.5 billion contribution in subscriber fees generated by service providers (General Motor's On Star™ and Ford's SYNC™); and
- A projected increase of \$0.35 billion for CY 2009 for these above two categories combined to total \$4.25 billion for CY 2009.³⁰

Total revenue contributions are expected to grow to \$8.4 billion by CY 2015. This estimate is based on the assumption that the *ITS* share of those industries' revenue stays constant at 8 percent.³¹ See Appendix F for the methodology employed in estimating the U.S. motor vehicle sector's contribution to the North American *ITS* market.

How do *ITS* industry end-use revenues compare to revenues of other industries?

The end-use *ITS* market in the U.S., estimated at \$48 billion, is larger in size than the U.S. markets for electronic computers, motion picture and video production, direct mail advertising, or internet advertising.

Figure 4 depicts CY 2009 U.S. revenue estimates for the *ITS* end-use market as well as for other industries.³²

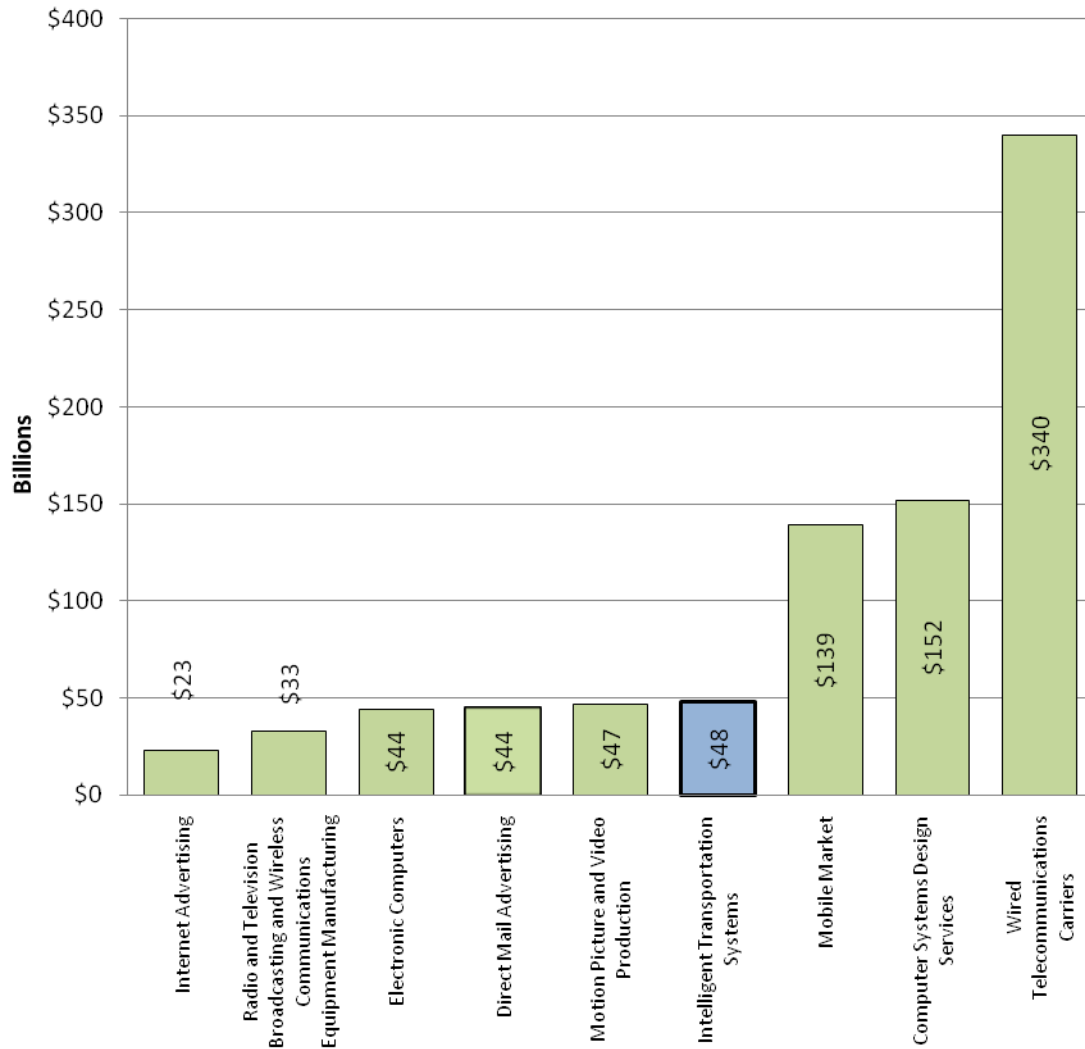
²⁹ Survey and firmographics data were not readily available for the Canadian and Mexican automotive sector. The estimate of this contribution is therefore only for the U.S.

³⁰ Motor vehicle components contribute an additional \$3.34 billion in *ITS* revenues; these contributions were derived from the NAICS code analysis and the model and are not included in the externally-derived \$4.25 billion.

³¹ The process for estimating the auto sector's share of the North American *ITS* market presented some challenges. Auto manufacturers—citing the full integration of technology to improve automotive transportation—said they were unable to segregate and estimate *ITS* revenue or employment and therefore did not respond to the MDA survey. Standard published data was also too broad to be useful. The modelers therefore employed an alternative approach using: (1) national input-output tables, including detailed commodity inputs purchased by each industry; (2) survey responses from auto parts manufacturers, who estimated their *ITS* revenue contributions ranged between 6 and 10 percent of total CY 2008 revenues; and (3) information on the telematics service portion of the auto sector from *Telematics IQ Daily New*. See Appendix F for the step-by-step processed used.

³² Source: IHS Global Insight, Inc.

Figure 4: Comparison of End-Use U.S. ITS Industry Revenues to Revenues of Other U.S. Industries



ITS EMPLOYMENT

How many private sector jobs in the ITS-value chain are attributable to end-use products and services?

ITS end-use products and services contribute almost 180,000 private sector U.S. jobs, or 40 percent of total ITS-related employment. By CY 2015, these end-use jobs are projected to increase 14 percent over CY 2009 levels. The rest of North America contributes an additional 20,000 jobs.

How many of these ITS jobs were in motor vehicle manufacturing?

The U.S. motor vehicle manufacturing sector contributed 10,500 ITS jobs in CY 2009. Sectoral employment growth rate analysis predicts an increase to 17,725 such jobs by CY 2015.

How many employees do most *ITS* companies have?

Companies in the *ITS* industry vary widely in scope and size, not only in terms of revenue but also in terms of number of employees. Ninety-seven percent³³ of the companies responding to the survey that were predominantly focused on *ITS*³⁴ and reported employment figures had fewer than 500 employees. Of these, almost 76 percent had fewer than 50 employees. In contrast, those companies not largely focused on *ITS* tended to have larger workforces, with 43 percent reporting total employment of fewer than 50 employees.

How is *ITS* end-use employment distributed across the United States?

The model estimated not only total *ITS* end-use employment, but also generated state-by-state private sector projections. Figure 5 shows the density of *ITS* employees by state and Table 5, which follows, shows the specific number of private sector *ITS* workers by state for CY 2008 and CY 2009 and projections for CY 2010 through CY 2015. The top four states for private sector end-use employment are California, Texas, Virginia, and Florida.

³³ Sixty-two companies that were predominantly focused on *ITS* provided employment figures. Of these, 60 had fewer than 500 employees.

³⁴ A company is defined as “predominantly focused on *ITS*” if it reported 50 percent or more of CY 2009 gross revenues attributable to *ITS*.

See Appendix H, Table H-7 for parallel information on private sector employment for the full *ITS* value chain.

Figure 5: *ITS* Private Sector End-Use Employment by State (ranked by CY 2009)

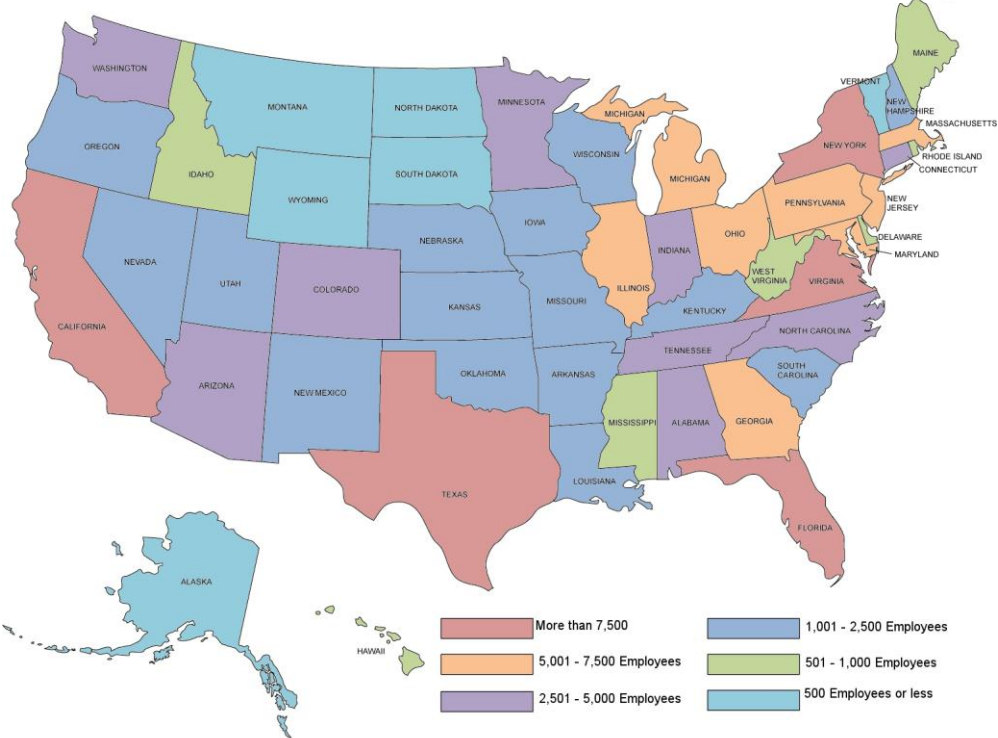


Table 5: ITS Private Sector End-Use Employment by State (ranked by CY 2009)

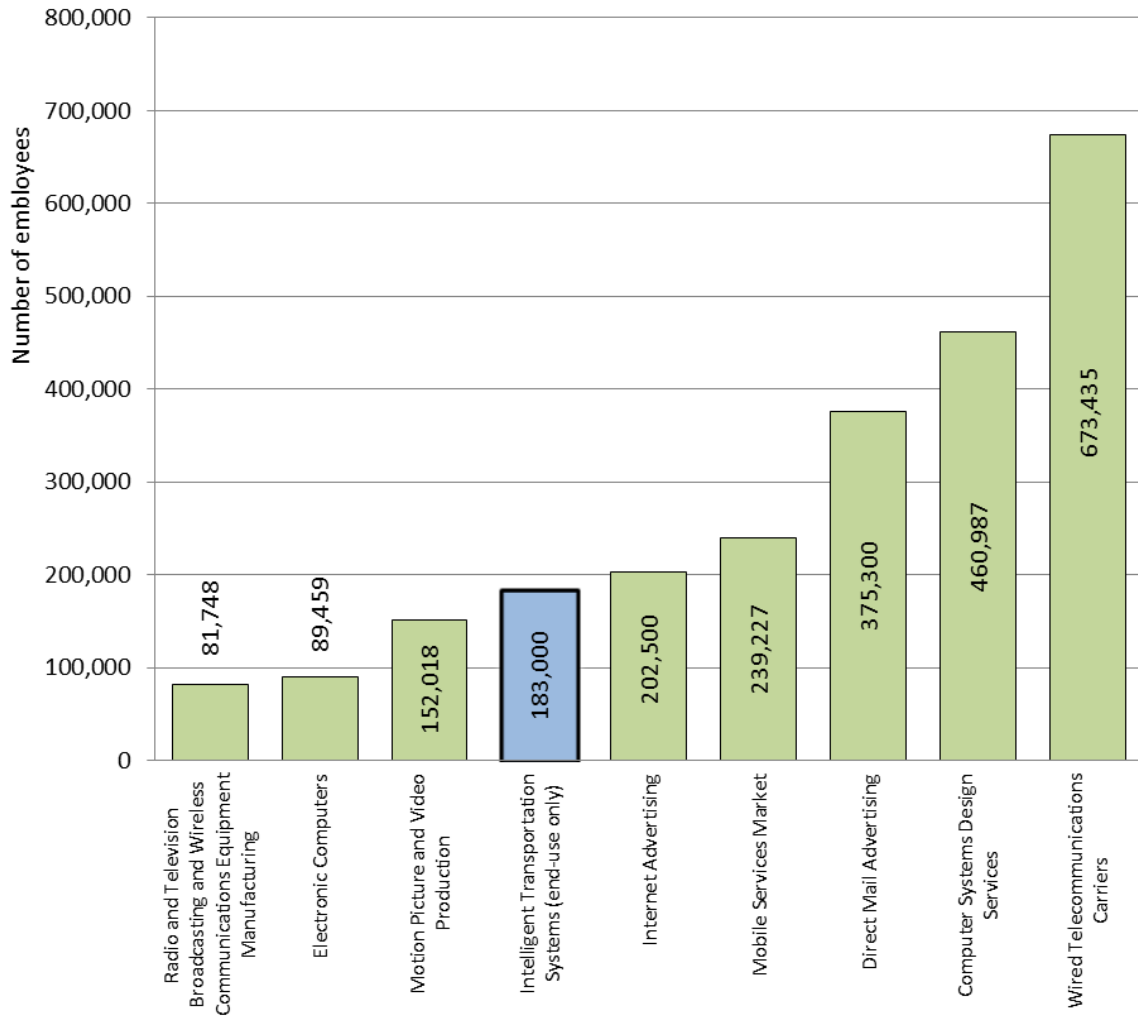
| Rank | State | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|-------------|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1 | California | 22,081 | 21,046 | 21,071 | 21,513 | 22,117 | 22,632 | 22,993 | 23,218 |
| 2 | Texas | 13,727 | 13,263 | 13,212 | 13,490 | 13,883 | 14,197 | 14,462 | 14,715 |
| 3 | Virginia | 10,828 | 10,603 | 10,646 | 10,760 | 11,284 | 11,669 | 12,011 | 12,319 |
| 4 | Florida | 8,635 | 8,280 | 8,228 | 8,413 | 8,756 | 9,063 | 9,342 | 9,517 |
| 5 | New York | 8,272 | 7,956 | 7,962 | 8,072 | 8,288 | 8,463 | 8,610 | 8,707 |
| 6 | Illinois | 6,811 | 6,556 | 6,580 | 6,826 | 7,141 | 7,360 | 7,513 | 7,652 |
| 7 | New Jersey | 6,716 | 6,492 | 6,545 | 6,653 | 6,880 | 7,076 | 7,219 | 7,313 |
| 8 | Maryland | 6,607 | 6,462 | 6,490 | 6,537 | 6,670 | 6,818 | 6,893 | 6,949 |
| 9 | Pennsylvania | 6,551 | 6,349 | 6,433 | 6,601 | 6,860 | 7,098 | 7,268 | 7,434 |
| 10 | Massachusetts | 6,581 | 6,294 | 6,331 | 6,390 | 6,521 | 6,629 | 6,692 | 6,754 |
| 11 | Georgia | 6,413 | 6,142 | 6,160 | 6,371 | 6,637 | 6,922 | 7,124 | 7,307 |
| 12 | Michigan | 6,337 | 5,823 | 6,020 | 6,246 | 6,551 | 6,826 | 7,063 | 7,277 |
| 13 | Ohio | 6,080 | 5,751 | 5,856 | 5,910 | 6,073 | 6,254 | 6,416 | 6,560 |
| 14 | North Carolina | 5,176 | 4,898 | 4,914 | 5,017 | 5,221 | 5,403 | 5,555 | 5,729 |
| 15 | Colorado | 4,958 | 4,685 | 4,621 | 4,696 | 4,831 | 4,925 | 4,980 | 5,031 |
| 16 | Missouri | 4,094 | 4,012 | 4,052 | 4,100 | 4,208 | 4,293 | 4,310 | 4,329 |
| 17 | Washington | 3,892 | 3,778 | 3,750 | 3,758 | 3,870 | 3,972 | 4,039 | 4,109 |
| 18 | Indiana | 3,907 | 3,719 | 3,936 | 4,041 | 4,193 | 4,344 | 4,520 | 4,706 |
| 19 | Alabama | 3,413 | 3,308 | 3,493 | 3,660 | 3,853 | 4,097 | 4,301 | 4,514 |
| 20 | Minnesota | 3,432 | 3,236 | 3,327 | 3,400 | 3,523 | 3,635 | 3,753 | 3,825 |
| 21 | Arizona | 3,057 | 2,819 | 2,858 | 2,909 | 3,027 | 3,131 | 3,233 | 3,317 |
| 22 | Connecticut | 2,750 | 2,639 | 2,635 | 2,643 | 2,682 | 2,727 | 2,755 | 2,793 |
| 23 | Tennessee | 2,797 | 2,637 | 2,628 | 2,678 | 2,788 | 2,875 | 2,929 | 2,996 |
| 24 | Kentucky | 2,431 | 2,316 | 2,392 | 2,422 | 2,482 | 2,559 | 2,624 | 2,689 |
| 25 | Wisconsin | 2,294 | 2,197 | 2,277 | 2,309 | 2,365 | 2,434 | 2,518 | 2,632 |
| 26 | South Carolina | 2,114 | 2,143 | 2,215 | 2,291 | 2,423 | 2,540 | 2,656 | 2,765 |
| 27 | Oregon | 2,241 | 2,096 | 2,087 | 2,110 | 2,197 | 2,268 | 2,322 | 2,391 |
| 28 | Kansas | 2,118 | 2,026 | 2,037 | 2,125 | 2,252 | 2,372 | 2,449 | 2,522 |

| | | | | | | | | | |
|--------------|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 29 | Oklahoma | 2,084 | 2,002 | 2,019 | 2,082 | 2,177 | 2,236 | 2,288 | 2,353 |
| 30 | Utah | 1,828 | 1,780 | 1,817 | 1,877 | 1,960 | 2,047 | 2,108 | 2,171 |
| 31 | Nebraska | 1,552 | 1,525 | 1,540 | 1,564 | 1,596 | 1,635 | 1,668 | 1,728 |
| 32 | Louisiana | 1,501 | 1,493 | 1,473 | 1,499 | 1,539 | 1,586 | 1,614 | 1,637 |
| 33 | Iowa | 1,577 | 1,484 | 1,541 | 1,587 | 1,639 | 1,676 | 1,728 | 1,787 |
| 34 | New Hampshire | 1,309 | 1,245 | 1,253 | 1,261 | 1,290 | 1,303 | 1,310 | 1,324 |
| 35 | Mississippi | 1,249 | 1,211 | 1,202 | 1,220 | 1,258 | 1,286 | 1,320 | 1,345 |
| 36 | New Mexico | 1,254 | 1,200 | 1,192 | 1,206 | 1,237 | 1,259 | 1,271 | 1,291 |
| 37 | District of Columbia | 1,225 | 1,189 | 1,189 | 1,225 | 1,266 | 1,310 | 1,333 | 1,371 |
| 38 | Nevada | 1,086 | 1,043 | 1,023 | 1,040 | 1,083 | 1,126 | 1,151 | 1,185 |
| 39 | Arkansas | 1,044 | 1,037 | 1,058 | 1,088 | 1,145 | 1,193 | 1,228 | 1,275 |
| 40 | Idaho | 898 | 847 | 847 | 875 | 901 | 929 | 952 | 980 |
| 41 | Rhode Island | 807 | 787 | 792 | 804 | 843 | 877 | 900 | 912 |
| 42 | Delaware | 797 | 695 | 688 | 700 | 720 | 739 | 744 | 753 |
| 43 | Hawaii | 709 | 694 | 697 | 703 | 720 | 738 | 754 | 769 |
| 44 | West Virginia | 648 | 637 | 632 | 636 | 662 | 688 | 695 | 707 |
| 45 | Maine | 635 | 621 | 619 | 632 | 661 | 687 | 702 | 717 |
| 46 | Montana | 503 | 492 | 496 | 512 | 535 | 561 | 580 | 599 |
| 47 | South Dakota | 483 | 466 | 474 | 488 | 506 | 532 | 547 | 564 |
| 48 | Alaska | 438 | 448 | 451 | 456 | 473 | 488 | 498 | 510 |
| 49 | North Dakota | 416 | 418 | 412 | 421 | 446 | 468 | 484 | 507 |
| 50 | Vermont | 436 | 408 | 407 | 413 | 425 | 434 | 446 | 457 |
| 51 | Wyoming | 329 | 322 | 317 | 323 | 333 | 340 | 346 | 356 |
| Total | | 187,123 | 179,571 | 180,895 | 184,553 | 190,990 | 196,722 | 201,216 | 205,366 |

How does *ITS* end-use employment compare to employment in other industries?

The end-use *ITS* industry, with private sector 183,000 U.S. jobs, contributes more jobs to the U.S. economy than motion picture and video production; radio and television broadcasting and wireless communications equipment manufacturing; or electronic computers. Figure 6 provides comparative employment estimates by market.

Figure 6: End-Use U.S. *ITS* Industry Employment vs. Employment in Other Industries

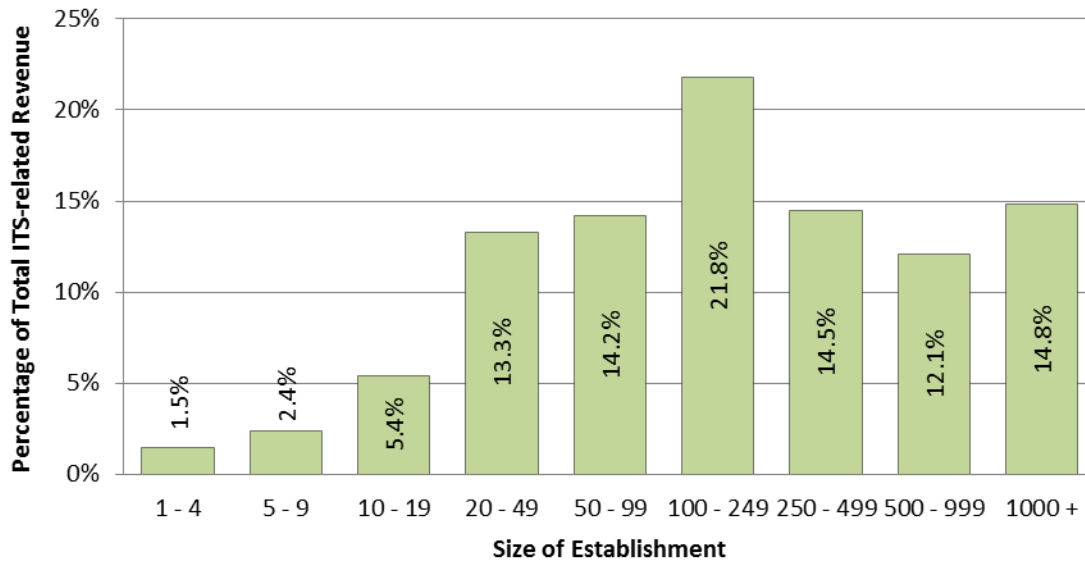


What is the relationship between company size and *ITS*- related revenue?

According to the model, 73 percent of U.S. *ITS* revenues are attributable to companies with fewer than 500 employees.

Figure 7 shows the distribution of U.S. *ITS*-related revenues by establishment size—defined as number of employees.

Figure 7: *ITS*-Related Revenue Distribution by Establishment Size



How many *ITS* private sector employees are there in North America and in the U.S.?

The econometric model shows CY 2009 North American *ITS* value chain employment of 494, 000. The Professional and Business Services sector had the highest number of North American *ITS* jobs, with more than 206,000 jobs. Manufacturing ranked second, contributing more than 156,000 jobs.

All but 10 percent of these *ITS* jobs are in the U.S. The 445,000 U.S. *ITS*-value chain jobs equate to 0.3 percent of the 138 million jobs in the U.S. in CY 2009.³⁵ Within the U.S., Engineering Services tops the list, with more than 74,000 private sector *ITS* employees, more than the double the second-ranked Computer Systems Design Services category. (See Appendix H, Table H-3, for U.S. *ITS* Employment by NAICS Industry.)

What is the employment outlook for the end-use *ITS* sector?

CY 2009 private sector employment in the end-use products and services portion of the *ITS* industry, which includes motor vehicle manufacturing, declined 4 percent from CY 2008 levels. Employment in this portion of the industry fared slightly better than the nation as a whole, but lagged behind the total *ITS* industry by one percentage point. The model projects end-use employment increases of 0.7

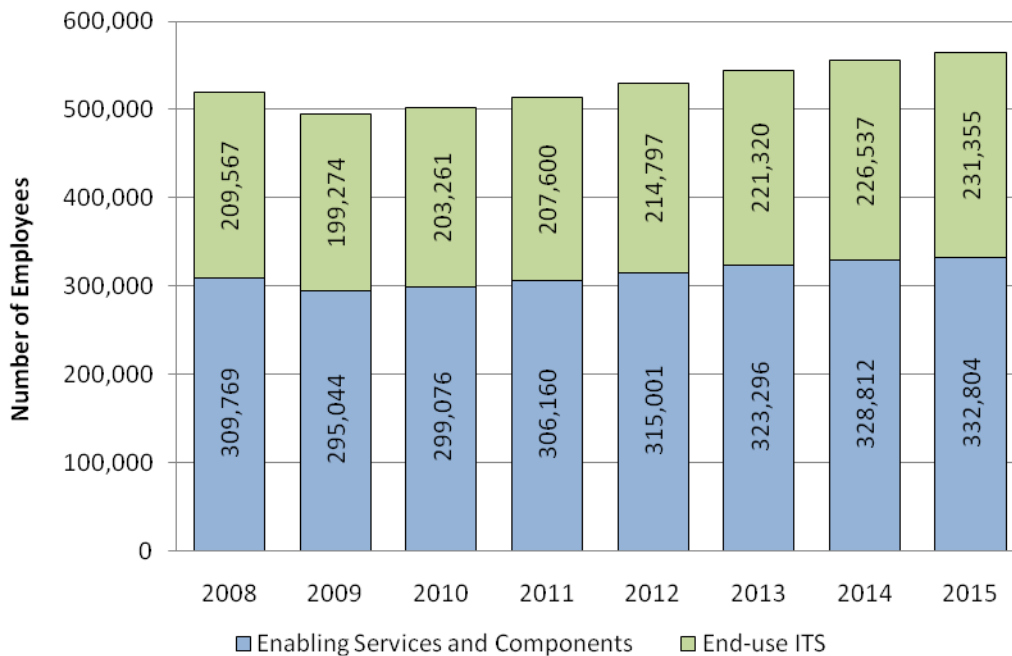
³⁵ Source: 2009 U.S. Household Survey, which includes both public and private sector employment.

percent in CY 2010 and 2 percent in CY 2011, with increases of from 2.1 percent to 3.5 percent for CY 2012 through CY 2015. The model projects CY 2015 U.S. private sector employment of almost 205,000 jobs and an additional 26,000 in the rest of North America.

What is the overall outlook for *ITS* employment?

The global recession and domestic economic slowdown led to a contraction of *ITS*-related industries in the U.S. and North America from CY 2008 to CY 2009, with North American *ITS* value chain employment dropping by 4.8 percent (25,000 jobs) from the CY 2008-level of 519,000 jobs to 494,000. During CY 2010, North American *ITS* value chain employment is expected to rebound, with an increase of 1.6 percent (8,000 jobs) from CY 2009 levels. Longer term, the outlook continues to brighten. The model projects a steady rise in North American *ITS* value chain employment from CY 2010 through CY 2015 to more than 564,000 jobs, an increase of 8.6 percent over 2008 employment levels. U.S. *ITS* value chain employment is likewise projected to increase 8 percent over CY 2008 levels of 463,000 to more than 500,000 jobs by CY 2015. Figure 8 depicts the North American private sector employment scenario from CY 2008 through CY 2015 for the end-use market as well as for the other components of the total value chain (enabling services and components).

Figure 8: North American *ITS*-related Employment Projections (CY 2008 – CY 2015)

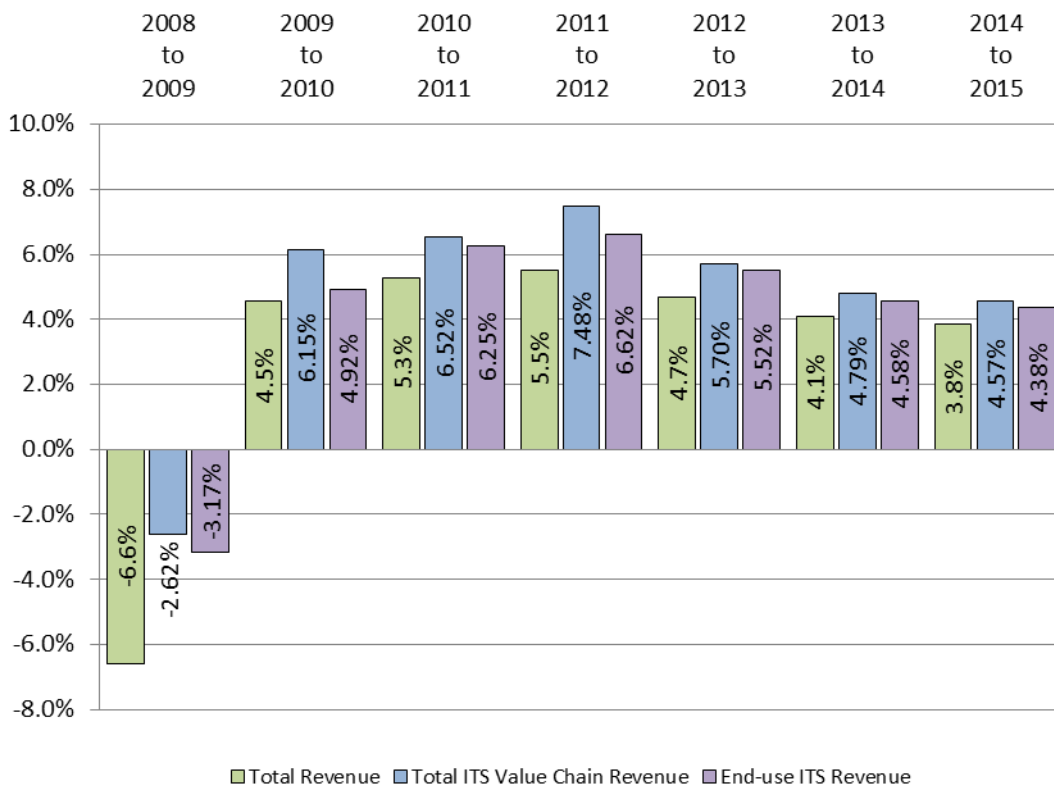


Industry survey respondents, who reported a more than 15 percent increase in employment from the end of CY 2008 to the end of CY 2009, were more optimistic about future job growth than the model. Surveyed companies sharing total employment for at least two consecutive years project an increase of more than 16 percent in North American employment for CY 2010 over CY 2009 levels. Domestic *ITS* employment is the strongest element in this projection. Researchers surmise that companies that were more fully engaged in *ITS* and growing were more likely to respond to the survey and report on their growth than companies more tangentially involved. (See Appendix E, Table E-5 and E-6, for additional details on the employment perspective of industry survey respondents).

How do *ITS* employment trends compare to overall North American employment trends?

Growth in both *ITS* value chain and end-use employment exceeds average growth in both the U.S. and North America. Figure 9 shows this North American employment comparison over a seven-year period, beginning with CY 2009, when the North American *ITS* industry experienced an almost 5 percent reduction in jobs. Although not depicted, the U.S. experienced a 4 percent reduction.

**Figure 9: Growth Rate of North American *ITS* Employment Compared to Total Employment
(CY 2008 – CY 2015)**



What were the most frequently reported *ITS* occupational categories?

Survey respondents from 104 companies distributed 2,272 *ITS* jobs, as of the end of CY 2009, among nine predetermined occupational categories. They also provided an average salary, by occupational category, for their U.S. employees.³⁶ The most frequently reported occupation among North American private sector *ITS* employees was technician/skilled labor, followed by “other engineering,” and software developer. Table 6 shows the number of jobs reported and the distribution among the occupational categories.

Table 6: Occupational Categories of U.S. *ITS* Jobs among Respondents

| Occupational Category | Number of Reported Jobs | Distribution Among Categories |
|------------------------------|--------------------------------|--------------------------------------|
| Hardware developer | 123 | 5.4% |
| Software developer | 291 | 12.8% |
| Other engineering | 322 | 14.2% |
| Marketing/Sales | 252 | 11.1% |
| Management | 197 | 8.6% |
| Legal | 5 | 0.2% |
| Finance | 84 | 3.7% |
| Technician/Skilled Labor | 712 | 31.3% |
| Other | 288 | 12.7% |
| Total | 2,272 | 100.0% |

The MDA industry survey showed that three occupations (software developer, hardware developer, and other engineering) account for 32 percent of the *ITS* jobs. Technicians/skilled labor account for an almost equal share (31.3 percent).

What is the outlook by occupation?

A 2009 *ITS* study³⁷ in the United Kingdom attributed the high percentage of *ITS*-created jobs in small business to the significant portion of *ITS* investment in software development and services. The MDA industry survey results support these observations. Looking across all three years, companies³⁸ that provided data project a 28 percent increase in software developer employment from CY 2008 through CY 2010.

³⁶ The MDA survey did not seek information from companies with three or fewer employees to avoid soliciting private salary information which could easily be linked to an individual.

³⁷ LSE Enterprises, Ltd. and The Information Technology Innovation Foundation, “The UK’s Digital Road to Recovery,” April 2009, p.11.

³⁸ Thirty-seven companies provided information about software developer employment for these years. Not all companies employed software developers.

Looking at companies that provided U.S. *ITS* occupational data for two consecutive years, CY 2009 saw double digit growth for the *ITS* core competency areas of software developers (18 percent) and “other engineering” (15 percent) as well as for marketing/sales (14 percent) and management (11 percent). Technicians/skilled labor employment rose by an average of 5 percent, hardware developers 1 percent, while legal employment was flat. Declining were the small segment of finance workers and, more significantly from a raw number perspective, employees categorized as “other.”

These companies also projected double digit percentage increases repeating in CY 2010 for marketing/sales (21 percent) and software developers (13 percent), and—contrary to the 2009 pattern—an average increase of 10 percent for hardware developers. CY 2010 is projected to see modest single digit growth for technicians/skilled labor and “other,” while employment in the least populated categories of legal and finance are expected to remain static.

Table 7 shows the average percentage change in employment by occupational category for those companies providing data for two consecutive years. The parenthetical numbers following each percentage are the number of companies providing data for that occupational category for the two-year period.

Table 7: Percent Change in *ITS* Employment by Occupational Category

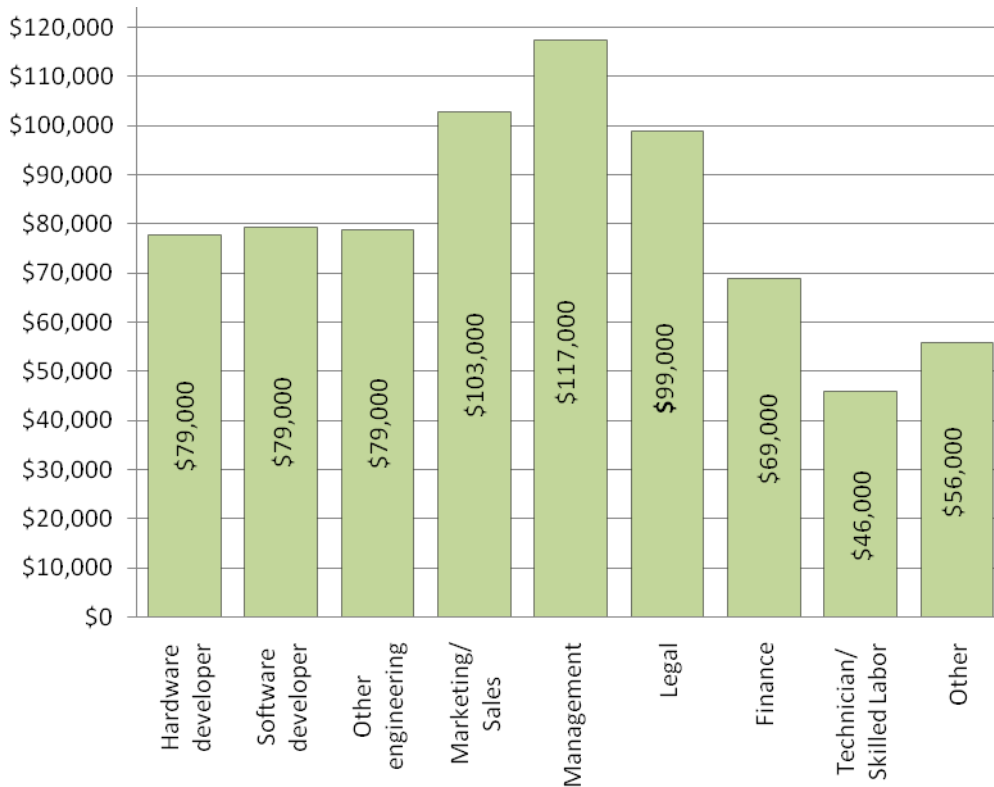
| Occupational Category | CY 2008-2009 | CY 2009-2010 |
|------------------------------|---------------------|---------------------|
| Hardware developer | 1% (27) | 10% (30) |
| Software developer | 18% (33) | 13% (42) |
| Other engineering | 15% (43) | 5% (44) |
| Marketing/Sales | 14% (44) | 21% (46) |
| Management | 11% (46) | 4% (47) |
| Legal | 0.0% (3) | 0.0% (4) |
| Finance | -3% (15) | 0.0% (17) |
| Technician/Skilled Labor | 5% (38) | 3% (37) |
| Other | -3% (22) | 1% (24) |

What was the average reported salary for a private sector *ITS* employee in the U.S.?

The survey also sought occupational information and average salary information for U.S. *ITS* employees. *ITS* companies reported a 2009 annual average salary of almost \$75,000.³⁹ Figure 10 depicts the average salary of U.S. *ITS* jobs by occupational category, as of the end of CY 2009.

³⁹ While the model did not seek to determine *ITS* salaries, the aggregated labor income derived from the IMPLAN model resulted in a CY 2009 total compensation value (including benefits) of \$96,629 in the U.S. and \$93,117 in North America. This is consistent with survey results showing an average U.S. *ITS* salary of \$75,000.

Figure 10: Average Salary* of United States *ITS* Jobs among Respondents



*Salary figures rounded to the nearest \$1,000.

Overall, the highest average *ITS* salaries in the U.S. were reported for those in management, marketing, and legal positions. The lowest average salaries were for technicians/skilled laborers and for the “other” occupations. Based on information provided by the 73 responding companies, the average *ITS* salary structure could be characterized as falling into four tiers, with the following average salary ranges as of the end of CY 2009:

- Tier 1-\$99,000 to \$117,000 for Legal, Marketing, and Management;
- Tier 2-\$78,000 to \$79,000 for Hardware and Software developers, and other Engineering;
- Tier 3-\$69,000 for Finance; and
- Tier 4-\$46,000 to \$56,000 for Technicians/Skilled Laborers and Other occupations.

ITS jobs typically require specialized skills and therefore command annual salaries more than \$32,000 above the national average of \$42,270, as reported in the most recently available data from the Bureau of Labor Statistics.⁴⁰ The 73 companies responding reported that more than half (almost 56

⁴⁰ See Bureau of Labor Statistics, May 2008 National Occupational Employment and Wage Estimates at http://www.bls.gov/oes/2008/may/oes_nat.htm. BLS released these statistics in February 2010. Mean annual salaries for relevant subgroups are: Management (including Marketing and Sales), \$100,310; Business and

percent) of their jobs fell into the seven highest paid occupational categories—earning \$69,000 or more—and that even the lowest paid *ITS* occupational category (Technician/Skilled Labor) earned 8.8 percent above the national average.

Financial Operations, \$64,720; Computer and Mathematical Science (including Software Engineers), \$74,500; Architecture and Engineering including Hardware and Other Engineers), \$71,430; Legal, \$92, 270; and Installation, Maintenance, and Repair (including Electrical and Electronics Installers and Repairers, Transportation Equipment), \$41,230.

***ITS* INNOVATION**

While not all inventions are patented, it is widely accepted that patent statistics are a reliable indicator of innovative activity.⁴¹ The U.S. Patent and Trademark Office (USPTO) classification system is very comprehensive. It does not, however, isolate *ITS* applications as a unique group. ITS America therefore relied upon expert Supervisory Patent Examiners across USPTO to guide the identification of classes and subclasses of applications most pertinent to *ITS* inventions.

Examiners identified 39 subclasses (distributed across six classes) most relevant to *ITS* inventions. The six identified classes are listed in Table 8 along with an example *ITS* application for each class.

Between January 1, 2004 and September 1, 2009 there were over 3,200 applications potentially related to *ITS* across the 39 subclasses. Without going through every application, it is only possible to conclude that researchers have data on the likely universe of total *ITS* patent applications.⁴² Based on this analysis in the pilot MDA effort, ITS America researchers concluded that the growth rate for *ITS* patent applications has outpaced the overall patent growth rate. Specifically, in the period from 2007 to 2008, when overall patent applications in the U.S. were static, *ITS* applications grew 17 percent.

As a follow-on to this analysis, the MDA survey asked respondents to identify the number of *ITS*-related patents held and the number of additional *ITS*-related patents for which the company had applied.

⁴¹ World Intellectual Property Organization, *World Patent Report, A Statistical Review, 2008*, p. 10.

⁴² Applications in each of the classes may relate to some other type of potentially-related invention, such as a self-directed lawnmower programmed to know the boundaries of a property.

Table 8: Six Patent Classes Most Relevant to ITS

| Class Number | Class Name | Example of an ITS Filing |
|---------------------|--|---|
| 180 | Motor vehicles | <u>Patent 7,603,221</u> — Slowing down process for a vehicle taking a bend |
| 244 | Aeronautics and astronautics | <u>Patent 7,596,438</u> — Beacon-based traffic control system |
| 246 | Railway switches and signals | <u>Patent 7,226,021</u> — System and method for detecting rail break or vehicle |
| 318 | Electricity: motive power systems | <u>Patent 7,444,226</u> — Electronic control device and method for controlling the operation of motor vehicle |
| 340 | Communications: electrical | <u>Patent 7,102,537</u> — Communication device using an Ultra Wide Band wireless wave |
| 701 | Data processing: vehicles, navigation, and relative location | <u>Patent 7,110,882</u> — Method for improving Global Positioning System integrity and detecting multipath interference using inertial navigation sensors and a network of mobile receivers |

What is the level of ITS patent activity among responding companies?

Altogether, 135 companies responded to a set of questions about ITS patent activity. Of these, 55 companies either held one or more ITS-related patents or had applied for a patent. Among these companies were small and large companies alike. Figure 11 shows the size of companies reporting that they either held or had applied for one or more ITS-related patents.

Figure 11: *ITS* Patent Activity by Responding Company Size

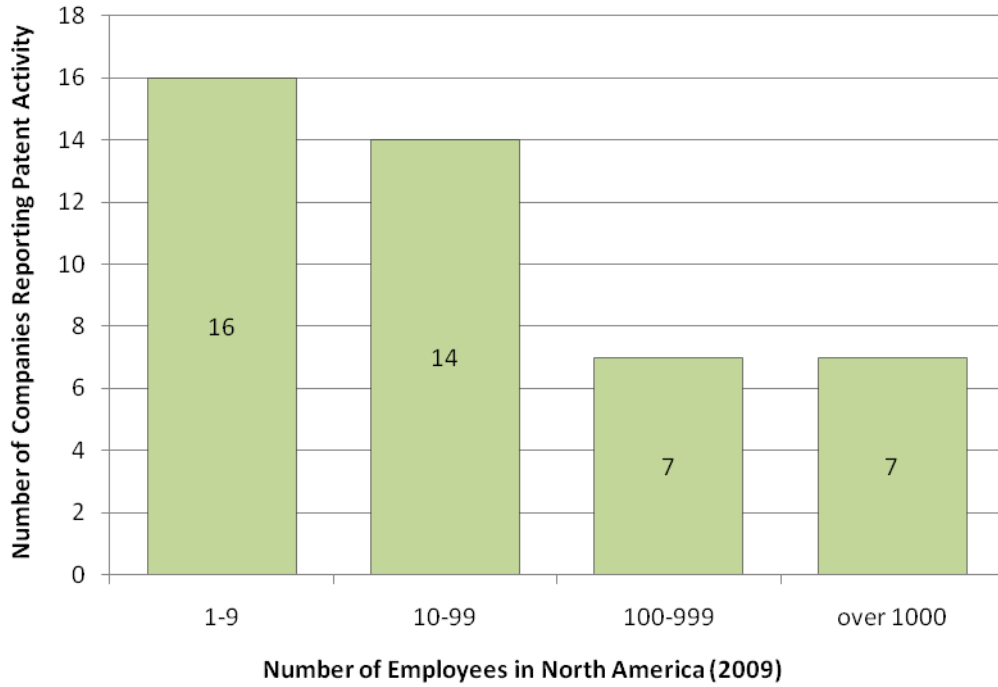
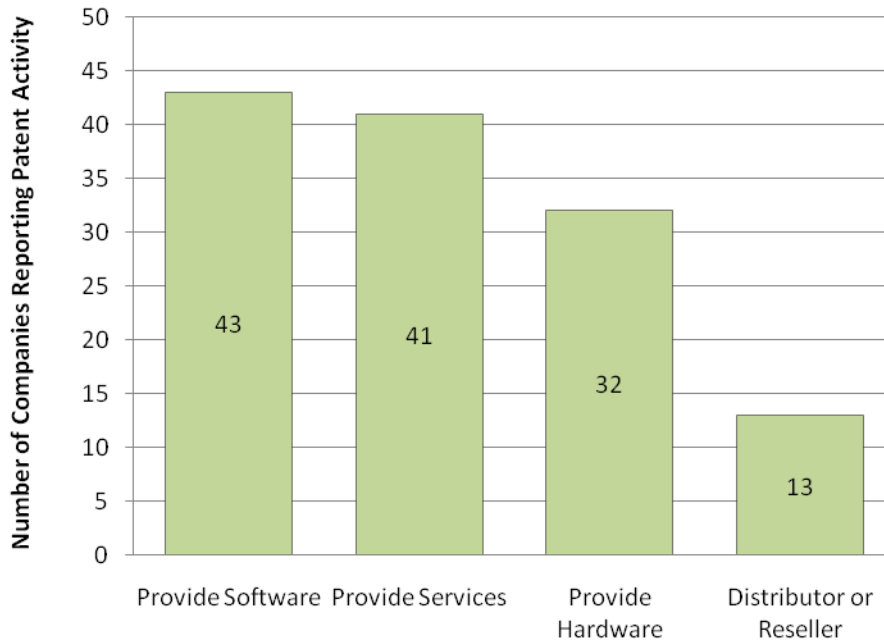


Figure 12 shows the number of companies reporting that they either held or had applied for one or more *ITS*-related patents by the product or service areas in which they indicated involvement.

Figure 12: *ITS* Patent Activity by Type of Product or Service



CONCLUSION

The MDA data base reflects input from the full and partial responses of 53 companies in the pilot effort and almost 300 companies in the second phase and, through additional research, the validation of some 3,000 companies operating in more than 40,000 locations in the *ITS* space. Based upon analysis of survey data, research, and econometric modeling and projections are the following observations about the U.S. and North American *ITS* industry:

- *The economic impact of the ITS industry is significant.* Modelers estimate an end-use U.S. *ITS* market of \$48 billion. The rest of North America contributes an additional \$4 billion in revenue. U.S. *ITS* revenues exceed those for direct mail advertising.
- *The outlook for the ITS industry is positive.* The model anticipates continuing expansion and a projected CY 2015 total U.S. end-use *ITS* market of \$67 billion and an additional \$6 billion for the rest of North America. From CY 2009 through CY 2015, revenues are expected to climb almost 41 percent—between \$2.7 billion to \$4.2 billion each year, with *ITS* revenue growth exceeding average growth for the U.S. and North America.
- *ITS employment impacts every state in the U.S.*
 - For CY 2009, the econometric model estimates 445,000 private sector U.S. *ITS* value chain jobs and 494,000 for all of North America.
 - The U.S. end-use market contributes almost 180,000 private sector jobs to this total; the rest of North America contributes an additional 20,000 end-use jobs.
 - The end-use *ITS* industry contributes more jobs to the U.S. economy than does the motion picture and video production market.
- *ITS jobs pay well.* Based on survey responses, average private sector *ITS* salaries are well above the national average by more than \$32,000. Even the lowest paid occupational category of *ITS* employees earns more than 8 percent above the national average wage. More than half of the U.S. *ITS* jobs categorized by occupation had associated salaries of \$69,000 or more.
- *The employment outlook for the U.S. and North American ITS industry is positive and better than for the economy overall.*
 - By CY 2015, North American end-use *ITS* private sector employment is projected to increase by 16 percent over CY 2009 levels and to contribute more than 231,000 jobs. During the same period, U.S. end-use employment is projected to increase 14 percent.
 - For the U.S. end-use market, the model projects private sector job gains of 0.7 percent in CY 2010 and 2 percent in CY 2011, with steadier growth of 3,600 to 6,400 jobs each year through CY 2015, when end-use market *ITS* employment is projected to reach more than 205,000.
 - *ITS* companies responding to the survey were more optimistic than model projections. These specific companies reported domestic *ITS* value chain employment increases of almost 15 percent from CY 2008 to CY 2009 and an expected, additional job increase of more than 13 percent in CY 2010.

- By CY 2015, the *ITS* value chain (including enabling services and components as well as end-use products and services) is projected to contribute 500,000 private sector U.S. jobs and an additional 64,000 in the rest of North America.
- *Small businesses play a significant role in the ITS industry.*
 - According to the model, 73 percent of U.S. *ITS* revenues are attributable to companies with fewer than 500 employees.
 - Ninety-seven percent⁴³ of the companies responding to the survey that were predominantly focused on *ITS*⁴⁴ and reported employment had fewer than 500 employees.
- *There is tremendous variety in ITS products.* The MDA survey and firmographics research confirm that at least 3,000 companies produce *ITS* products and services for the U.S. market; these companies in the *ITS* value chain span 86 NAICS industry sub-categories.
- *Patent statistics and survey data point to continued ITS industry growth and innovation.* Small and large companies alike apply for and are granted patents. From CY 2007 to CY 2008, when overall patent applications were static, U.S. *ITS*-related patents grew 17 percent.

⁴³ Sixty-two companies that were largely *ITS* provided employment figures. Of these, 60 had fewer than 500 employees.

⁴⁴ A company is defined as “predominantly focused on *ITS*” if it reported 50 percent or more of CY 2009 gross revenues attributable to *ITS*.

APPENDIX A — Technical Expert Group and ITS America Research Staff

TECHNICAL EXPERT GROUP

Chair, David St. Amant, *President and Chief Operating Officer of the Econolite Group, Inc.*, is a 29-year veteran of the electronic components distribution industry. The Econolite Group, headquartered in Anaheim, California, is the umbrella company of Econolite Control Products, Inc. and five other subsidiaries within the transportation industry. Prior to joining the Econolite Group in 2002, Mr. St. Amant spent 14 years serving in senior and executive level sales and marketing positions with Avnet, Inc., the world's largest distributor of electronic components. Mr. St. Amant served as Chair of the National Electrical Manufacturers Association Transportation Sector in 2004 and 2005. He has chaired ITS America's Policy and Business Council, on which he continues to serve, and currently serves on the ITS America Board of Directors. He has been an active member on the Board of Trustees and Executive Committee for Woodbury University.

Kirk T. Steudle, P.E., *Director, Michigan Department of Transportation (MDOT)* began his career with the Michigan DOT in 1987. In his current role, he is responsible for administering a highway program with 9,716 miles of state trunk line and 4,400 state highway bridges, a department with 2,800 employees statewide, and multi-modal transportation programs. Mr. Steudle chairs the American Association of State Highway and Transportation Officials subcommittee on Asset Management, serves on the Strategic Highway Research program oversight committee, and chaired the associated implementation report to the U.S. Congress. Mr. Steudle is a member of the board of directors of ITS America. He holds a Bachelor of Science degree in Construction Engineering from Lawrence Technological University.

Shawn M. Turner, P.E., *Senior Research Engineer, Mobility Analysis Program, Texas Transportation Institute*. Since joining the Institute in 1992, Mr. Turner has managed and performed a wide variety of transportation planning and traffic operations research. His primary areas of research include traffic data collection, data quality, decision support systems, and mobility analysis. As an active stakeholder, Mr. Turner played a role in adding the Archived Data User Service to the National ITS Architecture, as well as developing metadata standards within the American Society for Testing and Materials. Currently, he works with the Federal Highway Administration, state, and local agencies to advance the use of archived traffic data for better decision-making in traffic operations and transportation planning. Mr. Turner holds a B.S. in Civil Engineering from Pennsylvania State University and an M.S. in Civil Engineering from Texas A & M University.

Richard Weiland, *President, Weiland Consulting Co.*, which specializes in strategic planning for start-ups, with emphasis on the ITS industry. Mr. Weiland is internationally recognized for his work in ITS strategic and business planning and in shaping the U.S. and global ITS standards program. Mr. Weiland was formerly Senior Vice President and Executive Advisor, Ygomi LLC, an entrepreneurial company with longstanding interests in ITS. He was Chair of the Committee on ITS of the Transportation Research Board (National Research Council), the first chair of ITS America's Committee on Standards and Protocol, Chair of the ITS Standards Division of the Society of Automotive Engineers, and Chair of the U.S. Technical Advisory Group to ISO/TC204, the international committee on ITS Standards. Mr. Weiland holds degrees in mathematics, computer science, and business administration from the University of Michigan and the University of Chicago.

ITS AMERICA PROJECT TEAM

Roderick J. MacKenzie, who, during the course of this study, served as *Vice President for Programs and Chief Technology Officer*, provided oversight for ITS America's technical and business development programs and was responsible for leading the program staff. He also monitored new technologies and assessed their potential to become new products or services within the *ITS* marketplace. Mr. MacKenzie has more than 20 years of experience in the automotive, telematics, navigation, and mobile infotainment industries. Prior to joining ITS America in April 2009, he was the vice-president of advanced applications and services at XM Satellite Radio, where he led the development of new telematics capabilities and infotainment services, including real-time traffic and weather, with a particular focus on the company's core automotive business and OEM partners. Mr. MacKenzie holds a bachelor's degree in mechanical engineering from Brunel University in Uxbridge, England.

J. William Gadsby, *Senior Advisor*. Mr. Gadsby provided advice and day-to-day guidance to the program department staff on program management, project execution, and resource allocation and worked closely with the vice-president for programs to provide client support. Previously the vice president for academy studies at the National Academy of Public Administration, Mr. Gadsby directed the organization's overall research studies program and was responsible for business development, project and contract oversight, project staff management, and report development and quality. He also served more than 30 years with the Government Accountability Office, where he served in several senior executive positions. He has a bachelor's degree in accounting from the University of Rhode Island.

Laurie J. May, *Task Manager*. Prior to joining ITS America to lead the MDA study, Ms. May directed complex studies—many mandated by Congress—for the National Academy of Public Administration. These studies focused on various management and other issues at organizations such as the U.S. Patent and Trademark Office, the Centers for Disease Control and Prevention, the National Institutes of Health, the National Aeronautics and Space Administration, and the White House's Office of National Drug Control Policy. Prior to her time at the Academy, Ms. May served as the Director of the Organizational Management and Integrity Staff at the U.S. Environmental Protection Agency (EPA). As a senior EPA program management official, Ms. May directed a staff and provided organizational leadership and policy direction for the full range of management issues. She has served as a confidential management advisor to numerous Presidential appointees across EPA and is the recipient of EPA's Excellence in Management Award. Ms. May is a Phi Beta Kappa graduate of Duke University.

Christopher Sullivan, *Research Associate*. Mr. Sullivan joined ITS America in June 2009 and was involved in multiple facets of the Market Data Analysis study, including survey development, soliciting participation from companies and handling data analysis for the project. Prior to joining ITS America, he completed a Master of Public Policy and Administration at the Center for Public Policy and Administration at the University of Massachusetts–Amherst. Mr. Sullivan also holds a B.S. in Business Administration from Milligan College in Tennessee.

APPENDIX B — Summary of ITS Study Literature Review

| Report Name | Pages | Publish Date | Publisher | Link | Geographic Scope | Product Scope | Dollar Figure | Notes |
|--|-------|--------------|--------------|---|---|---|-------------------------|--|
| Intelligent Transportation Systems Review, 2009 | 393 | 2010 | BCC Research | http://www.the-infoshop.com/report/bc116936-its-review.html | Global | Telematics; In-vehicle Entertainment/Connectivity; Safety; Sensors; Navigation; Tolling; Infrastructure; Hybrids and EVS | N/A | This report is a collection of articles pertinent to each of the areas defined under the project scope. It doesn't seem to attempt to size the market in dollar figures. |
| Explaining International IT Application Leadership: Intelligent Transportation Systems | 53 | 2010 | ITIF | http://archive.itif.org/index.php?id=332 | Global | N/A | N/A | Does not attempt to size market |
| Intelligent Transport Systems in North America — A Market Opportunity Assessment | N/A | 2010 | IMS Research | http://www.imsresearch.com/files/security/Intelligent%20Transport%20Systems%20-%20A%20Market%20Opportunity%20Assessment%20-%20North%20America%20-%20202010%20-%20Proposal.pdf (project proposal document); http://www.businesswire.com/portal/site/home/permalink?ndmViewId=news_view&newsId=20100803005370&newsLang=en | United States (confined to state spending) | Video Surveillance, Sensors, DMS, RWIS | \$1.4 billion (in 2010) | |
| Global Telematics Market 2009-2013 | 20 | 2010 | TechNavio | http://www.researchandmarkets.com/research/7d4fe0/global_telematics | Americas, EU, APAC | N/A | Must buy report | |
| Intelligent Transportation Systems — A Global Market Perspective | 520 | 2009 | Bizacumen | http://www.researchandmarkets.com/reportinfo.asp?report_id=1095477 | Global (by U.S., Europe, Japan and Rest of the World) | Advanced Traffic Management Systems (ATMS); Electronic Toll Collection Systems; Public Vehicle Transportation Management Systems (PVTMS); Commercial Vehicle Operations (CVO) Systems; Advanced Vehicle Information Systems | Must buy report | |

| | | | | | | | | |
|--|-----|------|--------------------------------|---|--|---|-----------------|--|
| Intelligent Transportation Systems Market Overview | 56 | 2009 | ABI Research | http://www.abiresearch.com/research/1003306-Intelligent+Transportation+Systems+Market+Overview | Global (by North America, Latin America, Asia-Pacific, Japan, South Korea, Western Europe, Eastern Europe, Africa & the Middle East) | Consumer Telematics and Navigation (to include: Navigation Systems, Traffic Information, Emergency Calling, Congestion Pricing, Road Enforcement); Commercial Telematics (to include: AVL, AVI, FMS, Cargo/Trailer Tracking); Infrastructure (to include: ETC, Automatic Border Crossing); Safety Systems (to include: Adaptive Cruise Control, Lane-Keeping Assistance, Collision Avoidance Systems) | N/A | |
| TETRA and Intelligent Transportation Systems | | 2009 | Practel, Inc. | http://www.mindbranch.com/ldquo-TETRA-Intelligent-R606-87/ | Unknown | Wireless communications (specifically TETRA technology) | N/A | This report is confined to an analysis of the use of TETRA technology to ITS applications (which includes Automatic Vehicles Registration, Toll payment without stop, Exchange information in emergency situations, Enhancing safety, Support of Homeland Security). |
| The 2009 Report on Intelligent Transportation Systems (ITS): World Market Segmentation by City | 329 | 2009 | Icon Group International, Inc. | http://www.marketresearch.com/product/display.asp?productid=2103361 | Global (2000 cities across 200 countries) | N/A | Must buy report | Market size is not available without purchasing the report. Additionally, the scope of products considered is not available unless the report is purchased. |
| SupplierBusiness: Mirrors & Cameras Study | 84 | 2009 | Global Insights | http://www.supplierbusiness.com/reports_en/dpoint.asp?id=112&TC=MTB | Global (but sketchy) | Cameras and Mirrors(which can be applied to Night vision, Blind Spot Detection, Lane Departure Warning, Adaptive Cruise Control, Drowsy/distracted driver) | Must buy report | |

| | | | | | | | | |
|---|------|---------------|---|---|---|---|-----------------|--|
| Roads to Intelligent Transportation Systems: Assessment Technologies and Markets | 2009 | Practel, Inc. | http://www.mindbranch.com/listing/product/R606-94.html | United States | ITS telecommunications and radar technologies and related markets (the telecom discussion includes DSRC and CALM) | Must buy report | | |
| Geographic Information System (GIS) Market in Transportation Sector 2008-2012 | 20 | 2009 | TechNavio | http://www.bharatbook.com/detail.asp?id=126661&rt=Geographic-Information-System-GISMarket-in-Transportation-Sector-2008-2012.html | Americas, EU, APAC | GIS | Must buy report | |
| Strategic Analysis of the Telematics and Location Based Applications and Services Market in North America | 152 | 2009 | Frost & Sullivan | http://www.researchandmarkets.com/reportinfo.asp?report_id=852623&t=t&cat_id= | North America | Telematics (defined as products relating to Safety and security, Navigation, Remote vehicle access, Navigation, Infotainment) | Must buy report | |
| Intelligent Transportation Systems — Global Strategic Business Report | 771 | 2008 | Global Industry Analysts | http://www.researchandmarkets.com/reports/338420/intelligent_transportation_systems_global | Global (by U.S., Europe, Japan and Rest of the World) | Advanced Traffic Management Systems (ATMS), Electronic Toll Collection (ETC) Systems, Public Vehicle Transportation Management Systems (PVTMS), Commercial Vehicle Operations (CVO) Systems, and Others (includes Vehicle Safety Systems) | Must buy report | |
| Workforce Investment Board Industry Overview: Intelligent Transportation | | 2007 | California Council on Science and Technology | http://wibtoolkit.net/resources/documents/IOTrans.pdf | California | N/A | N/A | While this report provides broad estimates of number of jobs that may be associated with ITS, the analysis is confined to California, its job categories are broad and the derivation of the numbers is unclear. The dollar size of the market is not discussed. |

| | | | | | | | | |
|---|-----|------|------------------|---|---------------|--|------------------------|---|
| Strategic Analysis of Wireless Innovation in Intelligent Transportation Systems | 136 | 2006 | MBA Thesis | http://ir.lib.sfu.ca/bitstream/1892/4198/1/etd2769.pdf | Global | Advanced Transportation Management Systems; Electronic Toll Collection; Commercial Vehicle Operations; Advanced Public Transportation Systems; Advanced Traveler Information Systems | \$66 billion (in 2011) | The report uses statistics from Transport Canada which suggest an increase in the world market for the delineated <i>ITS</i> products from \$4.5 billion in 1996 to \$66 billion to 2006 |
| Economic impacts of Intelligent Transportation Systems | 640 | 2004 | Elsevier | http://books.google.com/books?id=85-m480rYNMC&source=gbs_navlinks_s | N/A | N/A | N/A | In general, this compendium of articles deals with a costs/benefit analysis of <i>ITS</i> and does not attempt to measure the total market size. |
| OEM Automotive Electronics in North America | | 2004 | Freedonia | http://www.freedoniagroup.com/brochure/17xx/1777smwe.pdf | North America | Engine and Drivetrain Electronics; Safety and Security Electronics; Comfort, Convenience and Entertainment Electronics; Navigation and Instrumentation Electronics | \$33.3 billion | This report considers the entire OEM Automotive Electronics Industry but has a segment that discusses demand specific to <i>ITS</i> systems (page 56). |
| North American Automotive Telematics Market | | 2001 | Frost & Sullivan | http://www.allbusiness.com/transportation/motor-vehicle-parts-manufacturing/809253-1.html | North America | Telematics | \$7 billion (by 2007) | Notes that the NA telematics market rose from \$60 million in 1999 to \$380 million in 2000. |
| The Digital Car: A Strategic View of Global In-Vehicle Communications Technologies and Next-Generation Telematics Systems | | 2001 | ABI Research | http://www.allbusiness.com/transportation/motor-vehicle-parts-manufacturing/784353-1.html | Global | Telematics (defined as SDARS, remote vehicle diagnostics, real-time traffic information and server-based navigation) | \$13 billion (by 2006) | Notes that satellite-based digital audio radio services (SDARS) will reach \$350 million by 2006. Additionally, it notes that the growth is expected to be \$3 billion in 2000 to almost \$13 billion by 2006. \$4 billion of the 2006 figure is expected to come from reoccurring service revenue. |

| | | | | | | | | |
|--|------|--------------------------------------|---|---|---------------------------------|--|---|---|
| Article in Global Positioning & Navigation News | 2000 | Global Positioning & Navigation News | http://www.allbusiness.com/technology/telecommunications-cell-phones/792354-1.html | Global | Telematics | \$47 billion (by 2010) | Predicted growth from \$4 billion in 2001 to \$47 billion in 2010 | |
| Intelligent Transport Systems: A Review of Technologies, Markets and Prospects | 191 | 1998 | Financial Times Automotive Publishing | http://books.google.com/books?id=ea-rNAAACAAJ&dq=Intelligent+Transport+Systems&lr=&cd=26; see page 20 on (http://ewh.ieee.org/tc/its/newsletters/v2n2.pdf) | Unknown | In-car navigational systems; Traffic information reporting; Traffic management systems; Position reporting and toll collection devices; Automotive safety devices | Unknown | |
| Intelligent Transportation Systems: Wireless In-Vehicle Navigation and Communication Technologies, Global Markets & Forecasts | | 1998 | ABI Research | http://www.allbusiness.com/transportation/motor-vehicle-parts-manufacturing/735236-1.html | Global | In-vehicle communication systems; in-vehicle navigation systems; electronic toll collection using smart cards and transponders; automatic vehicle identification; automatic vehicle location | \$18 billion (by 2003) | Predicts a growth from \$1 billion to \$18 billion between 1998 — 2003. A combination of AVL and electronic toll collection is said to reach \$1.6 billion by 2003 and collision avoidance systems will reach \$10 billion by 2003 |
| Market Report: Intelligent Vehicle Navigation Systems, Advanced Traveler Information Systems, Integrated Driver Information Systems and Vehicle Safety and Control Systems | | 1997 | SRI Consulting | http://www.allbusiness.com/transportation/transportation-navigation-tracking-systems/6982037-1.html | North America, Europe and Japan | Intelligent Vehicle Navigation Systems, Advanced Traveler Information Systems, Integrated Driver Information Systems and Vehicle Safety and Control Systems | \$22.5 billion (by 2011) | By 2011, the report estimates that these components of the ITS market will be worth: \$8.4 billion for in-vehicle navigation systems equipment, \$300 million for advanced traveler information equipment, and \$8.5 billion for vehicle safety and control systems |

| | | | | | | | |
|--|------|-----------------------------|---|----------------------|--|--|--|
| Intelligent Transportation Systems: National Investment and Market Analysis | 1997 | Apogee Research/ITS America | http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/3244.pdf | United States | Infrastructure (to include: Traffic management; Advanced public transportation systems; and Rail grade crossing) and Private Systems (to include Driver Vision Enhancement Systems, Driver Safety Monitoring Systems, Vehicle Safety Monitoring Systems, Obstacle Warning Systems, Fleet Tracking, Mayday Systems, Route Guidance and Information) | ~\$32 billion (in 2010) | Between 1996 and 2015 the U.S. Market is expected to have a cumulative value of \$420 billion (\$80 billion in public spending, \$340 in private spending); In 2010 this breaks down to roughly 27 billion in private spending, \$2.5 billion in commercial spending and \$2.5 billion in public spending. |
| Market Report: Advanced Traffic Management Systems, Electronic Toll Collection, Public Vehicle Transportation Management Systems and Commercial Vehicle Operations | 1996 | SRI Consulting | http://www.allbusiness.com/transportation/transportation-navigation-tracking-systems/7274740-1.html | NA, Europe and Japan | Advanced Traffic Management Systems, Electronic Toll Collection, Public Vehicle Transportation Management Systems and Commercial Vehicle Operations | \$25.8 billion (cumulative between 1996 -2011) | SRI Consulting put out a series of papers in 1996-1997 that looked at the market potential for a number of ITS areas (\$16.5 billion for advanced traffic management systems equipment, \$7.1 billion for electronic toll collection equipment, \$1.8 billion for public vehicle transportation management systems equipment and \$0.4). |

APPENDIX C — ITS Products and Services by Market Sector

ARCHIVED DATA MANAGEMENT

1. ITS Data Collection and Management
2. ITS Data Warehouses

COMMERCIAL VEHICLE OPERATIONS

1. Back Room Systems
 - Management Systems
 - Routing and Dispatch Systems
2. Driver Management Systems
 - Commercial Driver's License (CDL)/Motor Vehicle Reports (MVR) Screening Systems
 - Employer Notification Service
3. Driver Communication Systems
 - Onboard Satellite Communication
 - Onboard Terrestrial/Cell Phone Systems
4. Vehicle Monitoring and Management Systems
 - AVL (Automatic Vehicle Location)
 - Tractor GPS (Global Positioning Systems)/GLS (Global Locating Systems)
 - Trailer Tracking
 - DSRC/Transponders
5. Cargo Management Systems
 - Radio Frequency identification Tags (RFID)
 - Electronic Sealing Systems for Cargo Doors (E-SEALS)
6. Safety Management Systems
 - Driver Simulators
 - Lane-Departure Warning Systems
 - Vehicle Stability Systems (including RSC—Roll Stability Control and ESC—Electronic Stability Control)
 - Collision Warning Systems (CWS)
 - Collision Mitigation Systems
 - Tire Pressure Monitoring/Inflation Systems
 - Electronic Logbook and/or Electronic On-Board Recorders (EOBR)
 - Event Data Recorder (EDR)
 - Technologies related to Pre-clearance (including transponders)
7. Driver Credentialing Systems
 - Transportation Worker Identification Credential (TWIC)
 - Free and Secure Trade (FAST) Card
8. Other Systems and Technologies
 - Truck Parking Availability Systems
 - Thermal imaging systems including those used for brake inspection and people detection)
 - Products related to Commercial Vehicle Information Systems and Networks (CVISN) including CVIEW Systems
 - Electronic Toll Collection
 - Virtual Weigh Sites (VWS)

- Vehicle and Cargo Inspection System (VACIS)
- Vehicle Dimensioning
- Height Detection
- Weigh-in-motion
- License Plate Readers including cameras with Optical Character Recognition software)
- Performance-Based Brake Testing (including dynamometers, flat plate break testers, and infrared brake testers)
- Rollover Warning
- High Wind Warning
- Fog Warning

EMERGENCY MANAGEMENT

1. Early Warning System Alert and Advisory Systems
 - ITS sensors and surveillance systems, emergency call-taking systems/notification
2. Emergency Call-Taking and Dispatch Services
3. Emergency Routing Equipment Systems
 - May have short range communications for local signal
4. Emergency Signal Preemption
5. Transportation Infrastructure Protection Equipment/Systems
 - Threat sensors/surveillance/barrier/safeguard systems/automated and remotely controlled systems/blast shields, exhaust systems/data processing/notification
6. Roadway Service Patrols
 - Monitoring/dispatch/incident information collection and sharing
7. Mayday and Alarms Support Systems/Equipment
 - Manual or automatic driver initiation linked to vehicle sensors/general surveillance capabilities
8. Wide-Area Alert Systems
 - Alert systems for situations that pose threat to life and property, for transportation system operators and traveling public; uses dynamic message signs, highway advisory radio, in-vehicle displays, 511 traveler information systems, web sites
9. Disaster Response and Recovery Equipment/Systems
10. Disaster Traveler Information Systems/Software
 - Evacuation route planning devices, route parameters
11. Evacuation and Reentry Management Systems/Software
12. Telemedicine Applications/Systems

MAINTENANCE AND CONSTRUCTION MANAGEMENT

1. Vehicle and Equipment Tracking Systems
 - Road Weather Information Systems (RWIS)
2. Environmental/ Meteorological Sensors, fixed and other, including the Clarus System
 - Weather Information Processing/Distribution Systems/Equipment
 - Winter Maintenance Systems/Software
3. Hazard detection/updating/advisories
 - Roadway Automated Treatment Systems/Equipment
4. Monitors, forecasts, schedules, manages activities
 - Roadway Maintenance and Construction Management Systems/Software

5. Scheduling, coordination/on-board sensors, diagnostic
 - Work Zone Management Systems
6. CCTV traffic monitoring and control/dynamic message signs/coordination through ISP, Highway Advisory Radio
 - Environmental Probe Surveillance Equipment/Systems
7. Rain/sun sensors, vehicle monitoring, collection/aggregation of data from on-board systems/sharing of probe data
 - Infrastructure Monitoring Equipment
8. Fixed and vehicle-based sensors/probe monitoring

PUBLIC TRANSPORTATION

1. ITS Archived Data/Business Intelligence Systems
2. Voice/Data Communications Systems
3. Computer-Assisted Dispatch (CAD) System
4. Automatic Vehicle Location (AVL) System for Buses
5. Automated Train Location System (ATLS) for Rail Transit
6. Transit Signal Priority (TSP) System
 - Light/Heavy Rail Preemption systems
7. Connection Protection/Notification Systems
8. Positive Train Control
9. Automated Vehicle Monitoring (AVM)
 - Vehicle Health Monitoring System
10. Automatic Passenger Counting (APC) System
11. Transit Travel Information (TTI) Systems
 - On-Board Next-Stop Announcement (audio/visual)
 - Bus Arrival Prediction Systems
 - Passenger Information Display Systems (stops/stations)
 - Traveler Information Kiosks
 - IVR / Web Site Traveler Information Systems
 - Trip Planning Systems
 - Alert Notification Systems
 - TTI Mobile Device Applications
 - On-Board Public Internet Access
12. Advanced Fare Collection (AFC)/Electronic Payment Systems
13. Security Systems
 - On-Board Surveillance Systems
 - Infrastructure Surveillance (video, audio)
 - Object / Intrusion Detection Systems
 - Transit Security Threat Sensors (chemical, toxic, biological, explosive, radiological)
 - Rail Infrastructure Integrity Monitoring (e.g. rail track continuity, bridge structure integrity)
 - Wireless Emergency Communications Systems
14. Demand-Responsive Transit
 - Automated Reservation (IVR /Web) System
 - Demand Responsive Scheduling System
 - CAD/AVL for Demand-Responsive Operations
 - Travel Management Coordination Center (TMCC) Operation

TRAFFIC MANAGEMENT

1. Freeway and Arterial Management Systems
2. Active Traffic Management Systems
3. Traffic Decision Support and Demand Management Systems
4. Regional Traffic Management Roadside Instrumentation/Hardware/Software
 - Coordinated signal control/arterial signal control with communications links between jurisdictions
5. Traffic Incident Management Equipment/Systems
 - Surveillance/CAD, CCTV
6. Roadway Weather Information Systems (RWIS)
7. Traffic Detectors/Surveillance Equipment
 - Fixed-point Sensors/Surveillance
8. Traffic Probes
 - Wide area wireless/dedicated short range between passing vehicles and roadside/point detection
9. Signaling and Control Devices
 - Real time coordination not required/typical urban traffic control system
10. Intersection Cabinet Safety Devices/Components
11. Battery Backup Systems (BBS)/Uninterruptible Power Supply (UPS) systems
12. Roadway Closure Equipment/Systems
 - Automatic/remote controlled gates/barriers/surveillance/monitoring/warning lights, CCTV cameras/information systems
13. Dynamic Message Signs
14. Electronic Toll Collection Equipment/Systems
 - Violation Detection/Fee Collection/Financial Clearinghouse/ Interoperability
15. Electrical Lighting and Management Systems
 - Variable/energy conservation/safety
16. Drawbridge Management
 - Control devices/forecasted status
17. Emissions Monitoring Equipment/Systems
 - Air quality data collection/storage/reporting/display
18. Speed Monitoring Equipment/Systems
 - Roadside signage/enforcement notification linkage
19. Variable Speed Controls
20. HOV Lane Management Equipment
 - Time of day rights of way/reserved lanes/vehicle occupancy
 - Detectors/compliance/enforcement
21. Mainline Lane Controls
22. Reversible Lane Management Equipment/Systems
 - Surveillance/wrong-way sensors/physical lane access control/electronic reconfiguration
23. Metering
 - Interchange Metering, Ramp Metering, Mainline Metering products
24. Regional Parking Management Equipment/ Systems
 - Multimodal/regional information sharing
25. Parking Facility Management Equipment/Systems
 - Electronic parking fee collection/parking status data

26. Asset Management Systems

- Systems which track and monitor the health of equipment related to traffic management

TRAVELER INFORMATION

1. Vehicle Telematics
2. Transportation Data for Vehicle Operators
 - Real-time, web applications, or network interface
3. Vehicle-to-Vehicle Traveler Information
 - Dedicated short range communications/location-specific
4. Broadcast Traveler Information
 - Using FM subcarrier, satellite radio, cellular data broadcast, internet web casts
5. Interactive Traveler Information
 - Using 511-like portal, Smart Phone, kiosk, personal computer, in vehicle devices
6. ISP Based Trip Planning and Route Guidance
 - Multi-modal, based on traveler preferences/constraints
7. Autonomous Route Guidance
 - In-vehicle sensory, location determination, computational, map database based on static, stored information, GPS
8. Dynamic Route Guidance
 - Using digital receiver for real-time information
9. Dynamic In-Vehicle Signing
 - Local conditions via sensors, highway/rail intersection status, emergency vehicles, maintenance and construction
10. Static In-Vehicle Signing
 - Stop, curve warning, guide, service, directional
11. Yellow Pages and Reservations Services
 - In-vehicle using wireless/pre-trip using fixed connections

VEHICLE SAFETY

1. Automated Vehicle Systems
 - Hands-off operation/vehicle to vehicle communications and supporting infrastructure
2. Cooperative Vehicle Safety Systems
 - Message exchange with surrounding vehicles and roadside equipment
3. Vehicle Safety Monitoring and Assistance Systems
 - Active and passive on-board sensors and systems which monitor vehicle condition/performance/safety. These might include:
 - Pre-Crash Restraint Deployment Equipment/Systems
 - Tire Pressure Monitoring
 - Brake Monitoring Systems
 - Emergency Brake Assist systems
 - Electronic Brake Force distribution systems
 - Anti-lock braking systems
 - Traction control systems
 - Active Headlights
 - Adaptive Cruise Control

- Advanced Vehicle Longitudinal Control System
- Electronic Stability Control Systems
- 4. Driver Safety Monitoring Equipment/Systems
 - On-board sensors to warn of potential dangers due to driver condition/performance. These might include:
 - Alcohol Screening for Drivers
 - Tiredness/Fatigue Warning Systems
 - Teen Speed Controls
- 5. Operator Assistance Systems
 - In-vehicle systems that provide information to assist the operator. These might include:
 - Curve Speed Warning Assistant,
 - Lane Departure Warning Systems,
 - Lane Change Assistants/Blind Spot Assistant
 - Rear View Cameras
 - Collision Avoidance Systems (Longitudinal/Lateral Safety Warning Equipment)
 - Night Vision
 - Head Up Display
 - Intersection Collision Warning
- 6. Collision Notification Systems

CROSS-CUTTING AND OTHER ITS PRODUCTS AND SERVICES

1. Communications
 - *ITS* Telecommunications/Data Communications/Networks
 - Network communications Security
2. Systems Integration
 - *ITS* System Integrators
3. Systems Engineering
 - *ITS* Systems Engineering
 - *ITS* Standards Development
 - National/Regional *ITS* Architecture Development
 - *ITS* Regional Strategic Planning
 - Planning and Execution of Systems Engineering Activities for *ITS* Projects
 - *ITS* Planning (e.g. for States, municipal planning organizations, and transportation authorities)

APPENDIX D — Market Data Analysis Industry Survey Instrument

MARKET DATA ANALYSIS SURVEY — MARCH 2010

About this Survey

In order to develop a credible estimate of the size of the North American Intelligent Transportation System (*ITS*) market, the Intelligent Transportation Society of America (ITS America) is conducting a survey of companies which offer products or services that are used in *ITS*. This survey, conducted under a contract with the U.S. Department of Transportation (U.S. DOT), contains questions which ask about a company's employees, revenues, and *ITS*-related patents.

Our Commitment to Your Confidentiality

ITS America is committed to keeping confidential the information that is provided in response to this survey. Click here to read ITS America's nondisclosure commitment as it relates to data collected through this survey.

Defining *ITS*

"Intelligent Transportation Systems" is a broad term encompassing many technologies which are used to improve the safety, security, sustainability, efficiency, effectiveness, accessibility, and productivity of the surface transportation system. As such, it is important to provide a concise definition of what constitutes the *ITS* market. For purposes of segmenting the *ITS* market for this study, ITS America has used U.S. DOT's National *ITS* Architecture as a framework and developed a listing of common *ITS* technologies within each segment. Some are used in multiple segments. These segments are listed below. For a listing of examples within each segment, click on the segment name.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of *ITS*

Saving Your Answers

Submitted pages are automatically saved. If you have not answered all of the questions on a page but need to leave the survey, hit the submit button on the bottom of that page before closing your browser to ensure that all of your answers are saved. You may come back to your responses at a later point by using the link that was contained in the email which you received and entering your password when prompted.

Questions

If you have any questions as you are completing the survey, please feel free to contact us at mdaproject@itsa.org and we will respond to your question quickly.

Page 1 – Screening Questions

Note: Please answer the questions below to determine your company's eligibility for this survey.

1. Based on the technology examples provided above, does your company or any of its subsidiaries produce *ITS*-related products or provide *ITS*-related services? *(required question)*

Yes

No

Action:

If "Yes" – show questions 2 and 3

If "No" – go to page 2

2. Does your company or any of its subsidiaries have employees in *ITS*-related jobs which are located in North America? *(required question)*

Yes

No

3. Does your company or any of its subsidiaries sell *ITS*-related products or provide *ITS*-related services in North America? *(required question)*

Yes

No

Note: Please do not use your browser's back button to navigate through this survey as doing so may result in a loss of information that has been entered on a page.

Action:

If Question 2 is "No" and Question 3 is "No" – go to page 3

All other answers – go to page 4

Page 2 — No ITS Selected

4. You indicated that neither your company nor its subsidiaries produce or provide *ITS*-related products or services.

Please click on the links below to see examples of technologies that we consider to be *ITS*-related and ensure that your product or service does relate to one of these categories and then make the appropriate selection below.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of *ITS*

Yes, **my company or its subsidiaries do** produce or provide *ITS*-related products or services (Note: you will be redirected to the front page to change your answer)

No, **neither my company nor its subsidiaries** produce or provide *ITS*-related products or services

Action:

If "Yes" – return to page 1

If "No" – go to page 17

Page 3 — No ITS Products or Employees in NA Selected

5. You indicated that neither your company nor its subsidiaries:

1. sell *ITS*-related products in North America or
2. provide *ITS*-related services in North America or
3. have employees in *ITS*-related jobs in North America.

Please click on the links below to see examples of technologies that we consider to be *ITS*-related and ensure that your product or service does not relate to one of these categories and then make the appropriate selection below.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of *ITS*

Yes, **my company or its subsidiaries do either** 1. sell *ITS*-related products in North America **or** 2. provide *ITS*-related services in North America **or** 3. have employees in *ITS*-related jobs in North America (*Note: you will be redirected to the front page to change your answer*)

No, **neither my company nor its subsidiaries** 1. sell *ITS*-related products in North America **or** 2. provide *ITS*-related services in North America **or** 3. have employees in *ITS*-related jobs in North America

Action:

If "Yes" – return to page 1

If "No" – go to page 17

Page 4 — Parent Company and Subsidiaries

6. Please list the legal name of your company's parent company. If your company has no parent company please list the legal name of your company below.

7. Does the company that you listed in the question above have any subsidiaries which produce *ITS*-related products or provide *ITS*-related services?

Yes

No

Action:

If "Yes" – show question 8

If "No" – go to page 5

(Hidden Question)

8. Please list the name(s) of the subsidiaries of the company listed above which produce *ITS*-related products or provide *ITS*-related services.

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____

- 11. _____
- 12. _____
- 13. _____
- 14. _____
- 15. _____
- 16. _____
- 17. _____
- 18. _____
- 19. _____
- 20. _____

Action:

Go to next page

Page 5 — Parent Company and Subsidiaries (continued)

Note: The rest of this survey will ask questions regarding the amount of revenue generated by ITS-related products and services in North America as well as the number and types of employees that are involved in ITS-related work in North America.

Please only provide information for those companies which provide ITS-related products or services.

9. Will you be answering the questions in this survey for the parent company and all of the subsidiaries listed on the previous page?

Yes

No

Action:

If "Yes" – go to page 6

If "No" – show questions 10 and 11

Please choose those companies below for which you will be providing answers on this survey.
(Note: questions 10 and 11 below are populated by questions 6 and 8, respectively, on page 4)

(Hidden Question)

10. Parent Company

(Hidden Question)

11. Subsidiaries

Action:

Go to next page

Page 6 — Revenue

Note: The questions below ask for specific numbers. If you are unable to provide an exact figure, please provide your best estimate rather than leaving a question blank.

12. In the chart below, please provide your company's total gross revenue in the United States, as well as in the rest of North America, for calendar years 2008, 2009 and projections for calendar year 2010.

| | CY 2008 | CY 2009 | Projected for CY 2010 |
|--|----------------|----------------|------------------------------|
| Gross Revenue in the United States | | | |
| Gross Revenue in the rest of North America | | | |

13. In the chart below, please estimate the percentage of your gross revenue attributable to *ITS* in the U.S. Next, estimate the percentage of your gross revenue attributable to *ITS* in the rest of North America.

| | CY 2008 | CY 2009 | Projected for CY 2010 |
|--|----------------|----------------|------------------------------|
| Percentage of Gross Revenue in U.S. Attributable to <i>ITS</i> | | | |
| Percentage of Gross Revenue in rest of North America attributable to <i>ITS</i> | | | |

*Action:
Go to next page*

Page 7 — Employment

Note: The questions below ask for specific numbers. If you are unable to provide an exact figure, please provide your best estimate rather than leaving a question blank.

14. Recognizing that some companies have multiple business lines, some of which are not *ITS*-related, for the time periods below indicate your company's:

- (1) total employment in the United States
- (2) total employment in Canada
- (3) total employment in Mexico and
- (4) total employment in the rest of North America (Note: Unlike the questions on the previous page, numbers for Canada and Mexico should be provided in their respective categories rather than under the "rest of North America" category)

Please provide employment numbers in full-time equivalents.

| | As of 12/31/08 | As of 12/31/09 | Projected by 12/31/10 |
|--|-----------------------|-----------------------|------------------------------|
| Total Employees in United States | | | |
| Total Employees in Canada | | | |
| Total Employees in Mexico | | | |
| Total Employees in the rest of North America | | | |

15. For the time periods listed below, please provide the following information:

- (1) *ITS*-related employment in the United States
- (2) *ITS*-related employment in Canada
- (3) *ITS*-related employment in Mexico and
- (4) *ITS*-related employment in the rest of North America (Note: Unlike the questions on the previous page, numbers for Canada and Mexico should be provided in their respective categories rather than under the "rest of North America" category)

Please provide employment numbers in full-time equivalents.

| | As of 12/31/08 | As of 12/31/09 | Projected by 12/31/10 |
|---|-----------------------|-----------------------|------------------------------|
| <i>ITS</i> Employees in the United States | | | |
| <i>ITS</i> Employees in Canada | | | |
| <i>ITS</i> Employees in Mexico | | | |
| <i>ITS</i> Employees in the rest of North America | | | |

Note: If you indicated above that you have ITS-related employees in the United States, please select a state and list the number of ITS-related employees in that state for the listed time frames. To add additional states click the button below that says "I have ITS employees in additional states."

Please provide employment numbers in full-time equivalents.

16. Choose a state *(Drop down list containing States)*

As of 12/31/08 _____

As of 12/31/09 _____

Projected by 12/31/10 _____

I have *ITS* employees in
additional states

Action:
Go to next page

Page 8 — Employment (continued)

Note: the questions below ask for specific numbers. If you are unable to provide an exact figure, please provide your best estimate rather than leaving a question blank.

20. In the table below, for your *ITS*-related employees in the United States, please estimate the following for each occupational category:

- (1) the number of employees in each occupational category as of 12/31/08
- (2) the number of employees in each occupational category as of 12/31/09
- (3) the number of employees in each occupational category you anticipate to have as of 12/31/10
- (4) average annual salary for calendar year 2009 (Note: for reasons of confidentiality, please only provide average salary information if you have more than 3 employees in the United States)

If you do not have *ITS* employees in a particular category please place a '0' in that box. Please provide employment numbers in full-time equivalents.

| | Employees as of 12/31/2008 | Employees as of 12/31/2009 | Projected Employees by 12/31/2010 | Average 2009 Salary |
|--------------------------|-------------------------------|-------------------------------|---|------------------------|
| Hardware developer | | | | |
| Software developer | | | | |
| Other engineering | | | | |
| Marketing/Sales | | | | |
| Management | | | | |
| Legal | | | | |
| Finance | | | | |
| Technician/Skilled Labor | | | | |
| Other | | | | |

21. If you are not able to provide a breakdown of employees and salaries by occupational category in the table above, please check here ()

Action:
Question 21 checked – show question 22
Question 21 un-checked – go to next page

(Hidden Question)

22. If you cannot provide average salary figures by occupational category in the table above, please provide an overall average salary for your *ITS*-related employees as of the end of CY 2009.

Action:
Go to next page

Page 9 — Product and Services

23. Which types of *ITS*-related products or services are provided by this company or companies?
(Check all that apply) *(required question)*

- Hardware
- Software
- Services (including consulting, engineering, installation and system integration)
- Distributor or reseller of *ITS*-related products

Action:

For each area that is checked, the appropriate page is shown to the survey respondent.

*For example, if “Hardware” and “Software” are selected, the survey respondent would be presented with page 10 followed by page 11 but would not be presented with page 12 or 13 which correspond to the “Services including consulting, engineering, installation and system integration)” and the “Distributor or reseller of *ITS*-related products” selections.*

Page 10 — Hardware Description

You indicated that your company produces *ITS*-related hardware.

Please select the category or categories below in which this hardware is used. If you need help determining in which category or categories to place the hardware, click on the links below for some examples.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of *ITS*

24. Category of Application (check all that apply):

- Traffic Management
- Public Transportation
- Traveler Information
- Vehicle Safety
- Commercial Vehicle Operations
- Emergency Management
- Archived Data Management
- Maintenance and Construction Operations
- Cross-cutting and Other Areas of *ITS*

Action:

If "Cross-cutting and Other Areas of ITS" is selected, show Question 25

If "Cross-cutting and Other Areas of ITS" is not selected, go to the next page dictated by selections made in Question 23 on page 9.

(Hidden Question)

25. For those products that fall within the "Cross-cutting and Other Areas of *ITS*" category, please list more specific categories below. To add more than one category, click the "Add Another Category" button.

Add Another
Category

Action:

Go to the next page dictated by selections made in Question 23 on page 9.

Page 11 — Software Description

You indicated that your company produces *ITS*-related software.

Please select the category or categories below in which this software is used. If you need help determining in which category or categories to place the software, click on the links below for some examples.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of *ITS*

27. Category of Application (check all that apply):

- Traffic Management
- Public Transportation
- Traveler Information
- Vehicle Safety
- Commercial Vehicle Operations
- Emergency Management
- Archived Data Management
- Maintenance and Construction Operations
- Cross-cutting and Other Areas of *ITS*

Action:

If "Cross-cutting and Other Areas of ITS" is selected, show Question 28

If "Cross-cutting and Other Areas of ITS" is not selected, go to the next page dictated by selections made in Question 23 on page 9.

(Hidden Question)

28. For those products that fall within the "Cross-cutting and Other Areas of *ITS*" category, please list more specific categories below. To add more than one category, click the "Add Another Category" button.

Add Another
Category

Action:

Go to the next page dictated by selections made in Question 23 on page 9.

Page 12 — Services Description

You indicated that your company provides *ITS*-related services (including consulting, engineering, installation and system integration).

Please select the category or categories below which related to these services. If you need help determining in which category or categories to place the services, click on the links below for some examples.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of *ITS*

30. Category of Application (check all that apply):

- Traffic Management
- Public Transportation
- Traveler Information
- Vehicle Safety
- Commercial Vehicle Operations
- Emergency Management
- Archived Data Management
- Maintenance and Construction Operations
- Cross-cutting and Other Areas of *ITS*

Action:

If "Cross-cutting and Other Areas of ITS" is selected, show Question 31

If "Cross-cutting and Other Areas of ITS" is not selected, go to the next page dictated by selections made in Question 23 on page 9.

(Hidden Question)

31. For those products that fall within the "Cross-cutting and Other Areas of *ITS*" category, please list more specific categories below. To add more than one category, click the "Add Another Category" button.

Add Another
Category

Action:

Go to the next page dictated by selections made in Question 23 on page 9.

Page 13 — Distributor or Reseller of ITS-related Products

You indicated that your company is a distributor or reseller of ITS-related products.

Please select the category or categories below in which these products are used. If you need help determining in which category or categories to place these products, click on the links below for some examples.

1. Traffic Management | 2. Public Transportation | 3. Traveler Information
4. Vehicle Safety | 5. Commercial Vehicle Operations | 6. Emergency Management
7. Archived Data Management | 8. Maintenance and Construction Operations | 9. Cross-cutting and Other Areas of ITS

33. Category of Application (check all that apply):

- Traffic Management
- Public Transportation
- Traveler Information
- Vehicle Safety
- Commercial Vehicle Operations
- Emergency Management
- Archived Data Management
- Maintenance and Construction Operations
- Cross-cutting and Other Areas of ITS

Action:

If "Cross-cutting and Other Areas of ITS" is selected, show Question 34

If "Cross-cutting and Other Areas of ITS" is not selected, go to the next page dictated by selections made in Question 23 on page 9.

(Hidden Question)

34. For those products that fall within the "Cross-cutting and Other Areas of ITS" category, please list more specific categories below. To add more than one category, click the "Add Another Category" button.

Add Another
Category

Action:

Go to next page

Page 14 — Industry Classification

Please select your company's primary and secondary industries from the North American Industry Classification System (NAICS) codes listed below. If you are answering for more than one company and the primary industry differs across companies, choose the primary industry that is most applicable.

Click [here](#) to see definitions for each of the industry classifications.

36. Primary Industry (select one)

- | | |
|--|---|
| 237 Heavy and Civil Engineering Construction | 424 Merchant Wholesalers, Nondurable Goods U.S. |
| 238 Specialty Trade Contractors | 425 Wholesale Electronic Markets and Agents and Brokers CAN |
| 325 Chemical Manufacturing | 481 Air Transportation |
| 326 Plastics and Rubber Products Manufacturing | 482 Rail Transportation |
| 327 Nonmetallic Mineral Product Manufacturing | 483 Water Transportation |
| 331 Primary Metal Manufacturing | 484 Truck Transportation |
| 332 Fabricated Metal Product Manufacturing | 485 Transit and Ground Passenger Transportation |
| 333 Machinery Manufacturing | 488 Support Activities for Transportation |
| 334 Computer and Electronic Product Manufacturing | 511 Publishing Industries (except Internet) |
| 335 Electrical Equipment, Appliance, and Component Manufacturing | 515 Broadcasting (except Internet) |
| 336 Transportation Equipment Manufacturing | 517 Telecommunications |
| 339 Miscellaneous Manufacturing | 518 Data Processing, Hosting, and Related Services |
| 423 Merchant Wholesalers, Durable Goods U.S. | 532 Rental and Leasing Services |
| | 541 Professional, Scientific, and Technical Services |
| | 551 Management of Companies and Enterprises |
| | 811 Repair and Maintenance |

37. () The three digit NAICS code for my company's primary industry isn't included in this list

Action:

Question 37 checked – show question 38

(Hidden Question)

38. Please enter the most appropriate three digit NAICS code to describe your company's primary industry.

39. Secondary Industry(s) (select one or more)

- | | |
|--|---|
| 237 Heavy and Civil Engineering Construction | 424 Merchant Wholesalers, Nondurable Goods U.S. |
| 238 Specialty Trade Contractors | 425 Wholesale Electronic Markets and Agents and Brokers CAN |
| 325 Chemical Manufacturing | 481 Air Transportation |
| 326 Plastics and Rubber Products Manufacturing | 482 Rail Transportation |
| 327 Nonmetallic Mineral Product Manufacturing | 483 Water Transportation |
| 331 Primary Metal Manufacturing | 484 Truck Transportation |
| 332 Fabricated Metal Product Manufacturing | 485 Transit and Ground Passenger Transportation |
| 333 Machinery Manufacturing | 488 Support Activities for Transportation |
| 334 Computer and Electronic Product Manufacturing | 511 Publishing Industries (except Internet) |
| 335 Electrical Equipment, Appliance, and Component Manufacturing | 515 Broadcasting (except Internet) |
| 336 Transportation Equipment Manufacturing | 517 Telecommunications |
| 339 Miscellaneous Manufacturing | 518 Data Processing, Hosting, and Related Services |
| 423 Merchant Wholesalers, Durable Goods U.S. | 532 Rental and Leasing Services |
| | 541 Professional, Scientific, and Technical Services |
| | 551 Management of Companies and Enterprises |
| | 811 Repair and Maintenance |

40. () The three digit NAICS code(s) for my company's secondary industry(s) aren't included in this list

Action:
Question 40 checked – show question 41

(Hidden Question)

41. Please enter the most appropriate three digit NAICS code(s) to describe your company's secondary industry(s).

Add another
industry
classification

Action:
Go to next page

Page 15 — ITS-related Patents

Note: the questions below ask for specific numbers. If you are unable to provide exact figures please provide your best estimate rather than leaving a question blank.

43. How many ITS-related patents does your company currently hold? (Drop down list containing values 0 -100 and a selection of "More than 100")

44. In addition to those patents already granted to your company, for how many ITS-related patents has your company applied? (Drop down list containing values 0 -100 and a selection of "More than 100")

Action:
Go to next page

Page 16 – Contact Information

45. If you would be willing to be contacted to further discuss your responses to this survey, if necessary, please list your contact information below.

Name _____

Email Address _____

Phone Number _____

46. If you have any comments relating to this survey, please provide these in the box below.

Action:
Go to next page

Page 17 — Thank You

Thank you for taking the time to complete this survey!

If you have any questions regarding ITS America's Market Data Analysis Project please contact Laurie May, Project Director, at lmay@itsa.org or 202-721-4221.

APPENDIX E — Industry Survey Methodology and Detailed Results

The MDA industry surveys were the primary research upon which this study and resultant market sizing were based. The responding companies represent a small, but critical sample of the companies active in the North American *ITS* space. Their willingness to share sensitive business information on a confidential basis has opened a window into the industry and enabled, for the first time, the development of credible industry revenue and employment estimates based on sound, verifiable data.

Given the importance of this primary research, this appendix:

- Provides a synopsis of the process/methodology employed in the Phase 2 industry survey; and
- Gives a detailed accounting and analysis of the responses of the almost 300 companies that provided meaningful *ITS* data.⁴⁵

SURVEY PROCESS AND METHODOLOGY

Industry Survey Responses

The survey opened on March 31, 2010 and closed on April 26, 2010, with 295 companies (10.5 percent of companies eligible to answer the survey) providing meaningful *ITS* data.

Survey Process

During the survey process, ITS America researchers received more than 1,000 emails, the majority of which were bounce backs for system delivery problems and out of office notice. As a result, researchers removed 693 companies from the initial list of potential respondents because they lacked valid email addresses. They also removed 99 companies after determining that they either were not active in the *ITS* industry or did not have a North American *ITS* revenues and/or *ITS* employees.

In addition, researchers received approximately 150 substantive emails relating to the survey. All of these required a follow-up. Questions in these messages related to such issues as coordination between a parent company and subsidiary, confidentiality, the reasons behind the survey, and need to reroute the survey to a new contact within the company.

ITS America researchers contacted 205 companies by phone to encourage participation in the survey. The majority of these companies were respondents from the pilot effort and members of an industry association. In addition, researchers contacted approximately 80 companies with high gross revenues to ensure that the survey results included the broad spectrum of those in the *ITS* industry and did not overly concentrate on the smaller and mid-size companies more likely to respond. Researchers made contact, either through voice mail or in live conversation, with 164 companies. Of these 164 companies,

⁴⁵ Econometric modelers can build a market model on a 5-6 percent response rate; the industry survey response rate, in excess of 10 percent, therefore provided an extremely credible source of input.

25 percent responded to the survey after the contact. The response rate for those called was therefore more than double the rate for the survey as a whole.⁴⁶

Definition of Outliers

For the components of this analysis where researchers calculated averages (See Tables 5 on occupations, E-2 on gross revenues, E-3 on *ITS* revenues), they removed outliers prior to calculation. In this context, outliers were defined as those values greater than three standard deviations from the mean when all observations were included. For these calculated averages, the number of responses does not include the removed outliers; in most cases, outliers comprised only one or two observations.

DETAILED SURVEY RESULTS

This section provides an in-depth look at the demographics of survey respondents, resultant data, and analysis upon which the economic model was built.

ITS Businesses

To provide a picture of the business areas in which *ITS* companies are engaged, the MDA survey asked respondents to indicate the industries in which they operated as well as the types of products and services they provided. Using a combination of survey respondent data and firmographics research, researchers identified company and establishment or site information for the targeted or key player companies. They cross-checked these industry classification codes and removed foreign companies not operating in North America as well as companies with invalid or outdated names.

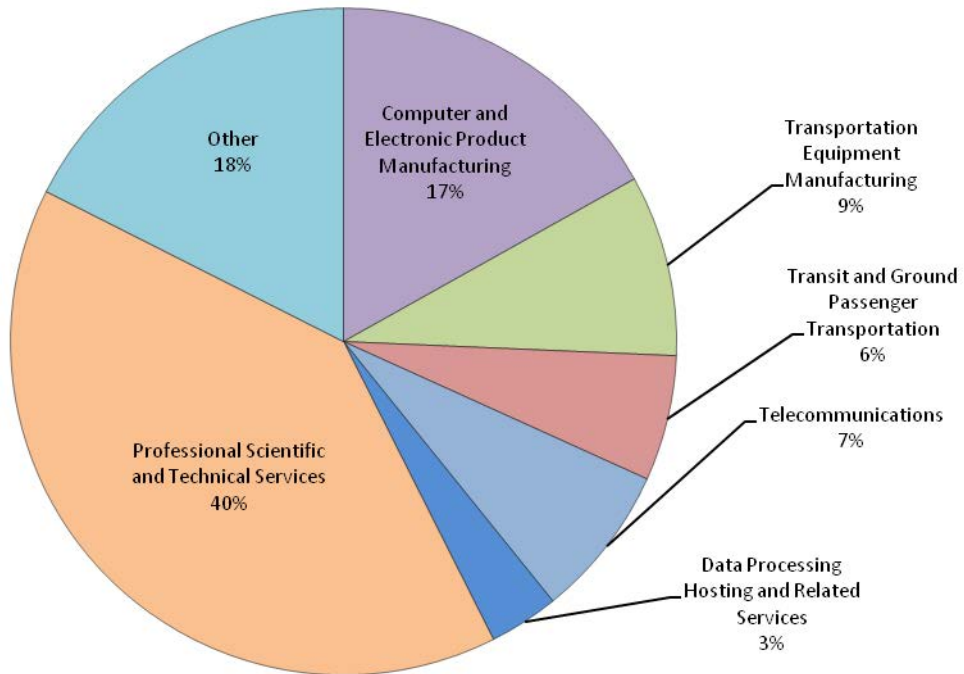
In what types of businesses are the ITS companies engaged?

About half of the survey respondents identified their primary and second industry classifications, using the North American Industry Classification System (NAICS). Figure E-1 shows that the top three survey-identified industries are Professional, Scientific, and Technical Services (40 percent); Computer and Electronic Product Manufacturing (17 percent) and Transportation Equipment Manufacturing (9 percent). The remaining respondents were distributed across 12 other categories. Secondary industry classifications likewise spanned 20 categories, with highest concentrations in Professional, Scientific, and Technical Services (13 percent), Computer and Electronic Product Manufacturing (12 percent), and Support Activities for Transportation (10 percent).

⁴⁶ This 25 percent mirrors the response rate for the Phase 1 survey in which we made personal contact with each respondent prior to sending the survey.

Figure E-1: Distribution of Primary Industries by NAICS Codes

(n=148)



The survey also asked companies to identify more broadly the types of *ITS*-related products or services they provided. Table E-1 shows how the respondents to this question categorized their companies' range of products and services within four categories: (1) Hardware; (2) Software; (3) Services including consulting, installation, engineering, and system integration); and (4) Distributor/Reseller of *ITS*-related products and across the nine *ITS* market areas. The survey generated responses from companies in all of the Market Package areas and for at least one company in each of the four enumerated categories.

Table E-1: Survey Respondent *ITS* Product/Service Categories

(n=159)⁴⁷

| <i>ITS</i> Market Segment | Provide Hardware (63) | Provide Software (88) | Provide Services (130) | Distributor or Reseller (33) |
|--|--------------------------|--------------------------|---------------------------|---------------------------------|
| Traffic Management (108) | 41 | 60 | 84 | 1 |
| Public Transportation (69) | 21 | 37 | 47 | 23 |
| Traveler Information (83) | 27 | 49 | 65 | 11 |
| Vehicle Safety (43) | 19 | 25 | 31 | 14 |
| Commercial Vehicle Operations (44) | 17 | 26 | 34 | 11 |
| Emergency Management (47) | 18 | 28 | 42 | 8 |
| Archived Data Management (44) | 13 | 30 | 32 | 7 |
| Maintenance and Construction Operations (46) | 12 | 19 | 41 | 7 |
| Cross-cutting and Other Areas of <i>ITS</i> (41) | 11 | 15 | 33 | 8 |

***ITS* Revenues**

The MDA industry survey included a wide range of companies, from individual transportation consultants and small companies solely focused on *ITS*, to international conglomerates with diverse product lines, including *ITS*. To capture revenues across this broad spectrum and portray relationships and impacts accurately, the survey sought information about company gross revenues as well as revenues attributable to *ITS*. Because the primary goal was to estimate North American *ITS* revenues, the survey did not inquire about revenues beyond North America. However, it did ask respondents to separate U.S. revenues from those in the rest of North America. Revenue-oriented questions focused on actuals for Calendar Years (CY) 2008 and 2009, and projections for CY 2010.

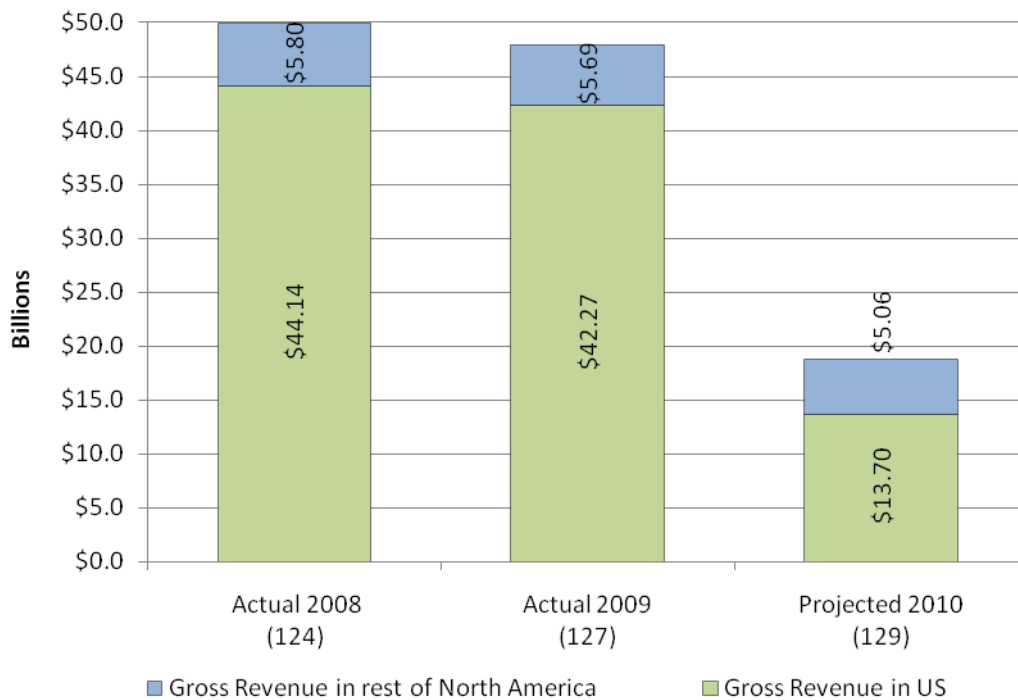
⁴⁷ The parenthetical number under each of the four product/service categories represents the number of companies reporting product/service activity within that category. The parenthetical number to the right of each *ITS* market segment represents the number of companies that reported business in that segment. The numbers in the center of the table are cross-tabulations of each product/service category and each market package. Companies frequently were engaged in multiple segments.

What gross revenues were reported?

Companies that sell *ITS* products or services in North America responded to this set of questions and provided gross revenue information for at least one year between CY 2008 and CY 2010. These companies reported gross total North American revenue of \$49.9 billion for CY 2008; gross revenues of \$48 billion for CY 2009 and projected gross revenue of \$18.8 billion for CY 2010. This projection for CY 2010 reflects a limited survey response to this request for sensitive information.⁴⁸

Figure E-2 shows the split between U.S. gross revenue and gross revenue in the rest of North America for each of these years. The parenthetical number below each CY, at the bottom of the graphic, indicates the number of companies providing data for that period.

Figure E-2: Gross Revenue Reported by Survey Respondents (n=135)



Researchers also examined data about actual and projected revenues on a company-by-company basis and calculated average percent change. This calculation provides a different perspective than looking at the aggregate. Table E-2 shows that, for companies sharing gross revenue data for at least two consecutive years, the overall prognosis is for an increase in gross North American revenues of 9 percent

⁴⁸ Because not all companies provided data for all three years, these figures should not be interpreted as the size of *ITS* market or used to calculate growth rates. Note that the decline in projected CY 2010 *ITS* revenues were driven by the response pattern of a handful of large companies who elected to provide only actual revenues and not projections. In some cases, company policy does not allow public disclosure of this sensitive business information.

from CY 2008 to CY 2009 and 38 percent projected from CY 2009 to CY 2010. Domestic gross revenues increased by 10 percent from CY 2008 to CY 2009 and are projected to increase by 34 percent in the following year. Gross revenues for the remainder of North America increased 8 percent in CY 2009 and are anticipated to continue on an upward trajectory—increasing 14 percent in 2010.

Table E-2: Average Percent Change in Gross Revenue⁴⁹

| | 2008-2009 | | 2009-2010 | |
|--|----------------|----------------------|----------------|----------------------|
| | Percent Change | Companies Responding | Percent Change | Companies Responding |
| Gross Revenue in U.S. | 10% | 117 | 34% | 116 |
| Gross Revenue in rest of North America | 8% | 42 | 14% | 43 |
| Total North American Gross Revenue ⁵⁰ | 9% | 120 | 38% | 120 |

What ITS revenues were reported by respondents?

As with gross revenues, companies were asked a set of questions about actual *ITS* revenues for CY 2008 and CY 2009 and projections for CY 2010. Not all companies provided responses for all three years.⁵¹

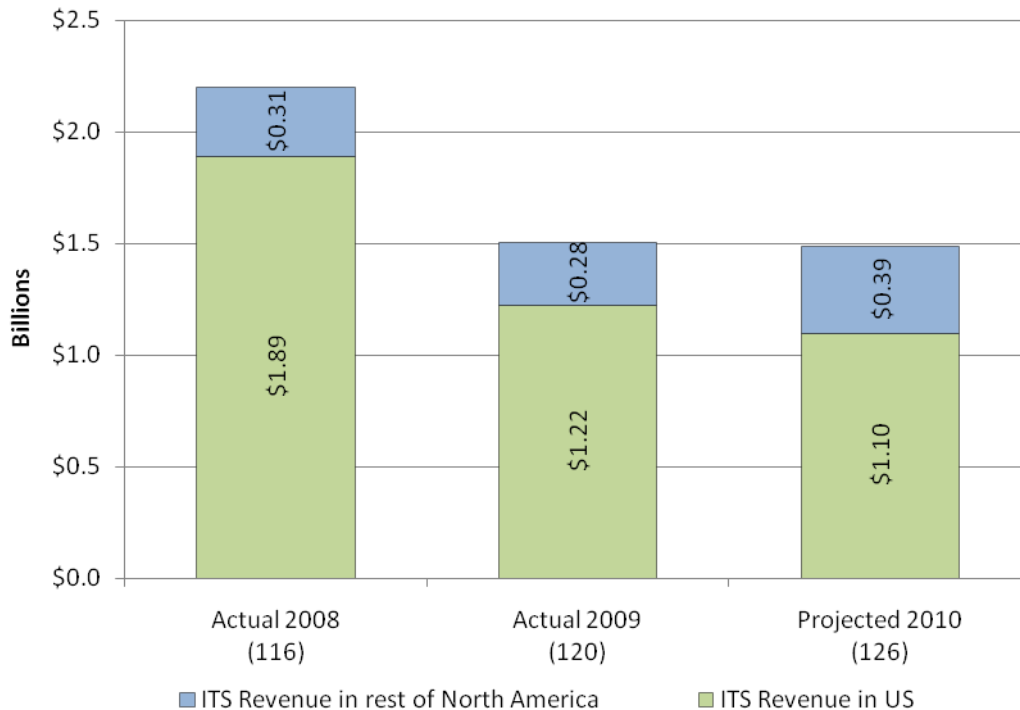
Responding companies reported North American revenue attributable to *ITS* of \$2.2 billion for CY 2008, \$1.5 billion for CY 2009, and projected CY 2010 levels roughly equal to those of CY 2009. Figure E-3 shows the split between revenue attributable to *ITS* in the U.S. and in the rest of North America for each of these three years. The parenthetical number below each CY indicates the number of companies providing data for that period.

⁴⁹ Year-over-year changes in gross revenue were calculated at the company level and only for those companies that provided revenue information in consecutive years. Companies were excluded from the analysis if they were considered to be outliers as previously outlined in this appendix.

⁵⁰ “Total North American Gross Revenue” was calculated by summing revenue variables for companies that provided revenue data for either the U.S. or areas in North America other than the U.S. Because this resulted in a larger sample size, some companies were removed as outliers in the calculations for the U.S. and the rest of North America, but did not qualify as outliers in the aggregated calculation. Percentages of the parts therefore cannot be summed. This same method of calculation was used for all growth rate calculations in this study.

⁵¹ Respondents were somewhat inconsistent in their provision of 2010 *ITS* revenue projections. While between 109 and 119 companies provided positive revenue data for each of the three requested years, some companies did not exist in 2008 and so did not provide data for that year. Other companies did not provide projections because of company policy about release of such sensitive information. Other new companies had no revenues in earlier years, but anticipated an *ITS* revenue stream in 2010.

Figure E-3: ITS Revenue Reported by Survey Respondents (n=130)



As with gross revenues, researchers examined actual and projected *ITS* revenues on a company-by-company basis and calculated average percent change. Looking at percentage level of change in *ITS* revenues over the three-year period, performance and expectations for *ITS* revenues exceed that for the companies overall. In North America, reported *ITS* revenues increased at a rate 8 percentage points higher than reported gross revenues between CY 2008 and CY 2009. The outlook for CY 2010 is likewise better for *ITS* than for gross revenues, with company-by-company projections of a 56 percent increase over CY 2009 across North America or 18 percentage points higher than for North American gross revenues. Domestically, *ITS* revenue among responding companies is expected to grow by 60 percent in 2010, as compared to company projections of 34 percent for domestic gross revenue.⁵² Table E-3 shows the average percent change in *ITS* revenue for each two-year period for the U.S., the rest of North America, and for the whole of North America.

⁵² As noted in the body of the report, industry survey respondents were more likely to be focused on the industry and optimistic about its future. The models, which have the benefit of wider research, firmographics data from proprietary data bases, economic forecasting, and tested modeling methodologies, are, by design, broader and more conservative in their projections.

Table E-3: Average Percent Change in *ITS* Revenues of Respondents

| | 2008-2009 | | 2009-2010 | |
|---|----------------|----------------------|----------------|----------------------|
| | Percent Change | Companies Responding | Percent Change | Companies Responding |
| <i>ITS</i> Revenue in U.S. | 18% | 109 | 60% | 112 |
| <i>ITS</i> Revenue in rest of North America | 11% | 33 | 60% | 37 |
| Total North American <i>ITS</i> Revenue | 17% | 112 | 56% | 115 |

How many responding companies were predominantly focused on *ITS*?

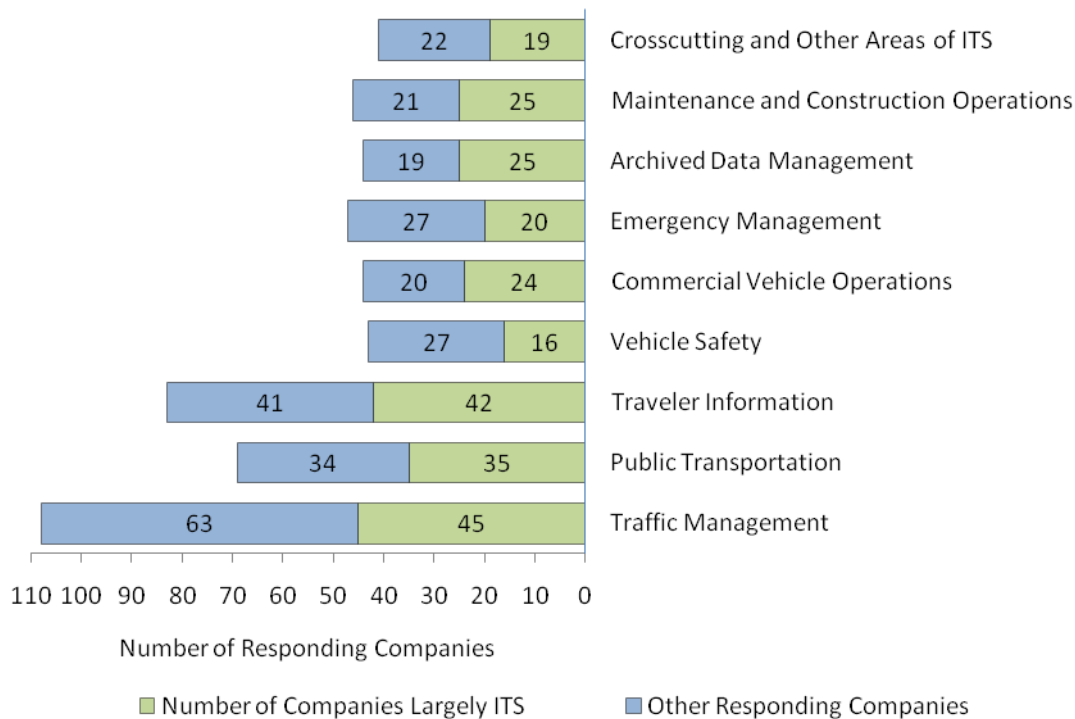
To develop an objective measure of how much of a company was “dedicated to *ITS*,” researchers looked at the percentage of company’s total gross revenue attributable to *ITS* in 2009. Companies with more than 50 percent of their revenue attributable to *ITS* made up 53 percent of survey respondents. Of the total number of respondents:

- 32 percent (43 of 136 companies) reported that 100 percent of their gross revenue was attributable to *ITS*; and
- An additional 21 percent (29 of 136 companies) reported that *ITS* comprised at least half, but not all, of their revenue.

For those companies providing information about the amount of their revenue derived from *ITS*, Figure E-4 shows the areas of the *ITS* market in which they indicated involvement.⁵³

⁵³ Eight of the 136 companies providing information on the amount of their revenue derived from *ITS*-related products and services did not provide information on the areas of application of their products and services; the sample size is therefore 128 companies.

Figure E-4: ITS Areas of Activity for Companies Providing ITS Revenue Data (n=128)



In this sample, the distribution of companies with at least half of their revenue attributable to *ITS* versus those with less, is similar across market areas. This suggests that both *ITS*-focused companies and more diversified companies are equally engaged across market areas.

ITS Employment

Survey respondents identified almost 3,650 *ITS* employees in the United States as of the end of CY 2009 and more than 1,800 in the remainder of North America, for a total 2009 North American *ITS* employment of just under 5,500.

Survey questions sought information about a company’s actual total employment and *ITS*-related employment as of the end of CY 2008, CY 2009, and projected at the end of CY 2010. The survey also asked respondents to identify U.S., Canadian, Mexican, and other North American employment.

The survey asked respondents to report Full-Time-Equivalent (FTE) employment. Companies totaled full and fractional amounts of FTEs to include contributions of part-time workers and those dedicated to multiple functions. This enabled the survey to capture *ITS* workers not solely dedicated to *ITS* work, but nonetheless engaged in *ITS* for some portion of their work year. The survey instructed companies not to include contractors or consultants, because they were captured by other responding entities.

How many ITS employees are in North America?

At the end of CY 2009, total employment in North America among responding companies was over 108,000, of which 5.1 percent (5,466 FTE) were dedicated to *ITS*. Of the 116 companies indicating that they had *ITS*-related employees in 2009, 109 had U.S. *ITS* employees; 17 had *ITS* employees in Canada; 7 in Mexico; and 4 in other North American locations, with many companies having multiple North American locations. Table E-4 shows survey respondent-reported *ITS* employment in the U.S. and the rest of North America as of the end of CY 2008 and CY 2009.⁵⁴

**Table E-4: Actual North American *ITS* Employment among Survey Respondents
(In Full-Time Equivalent)**

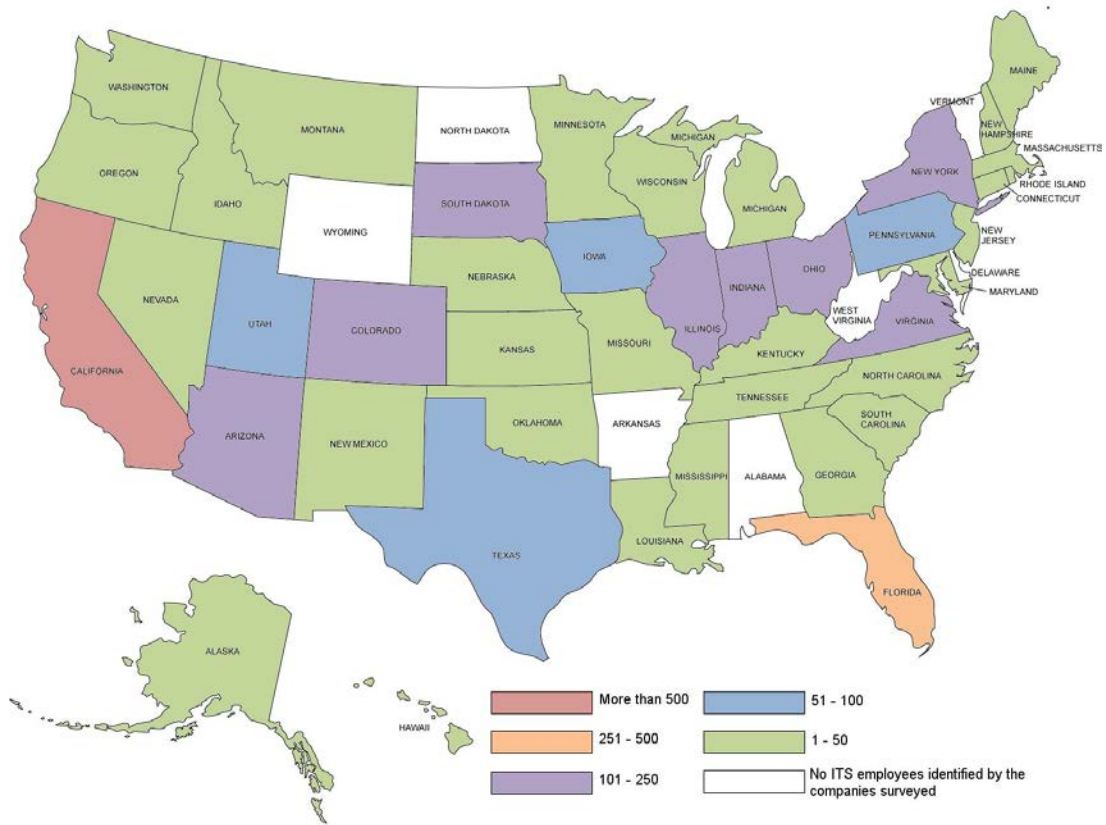
| | As of 12/31/2008 | As of 12/31/2009 |
|------------------------------------|-------------------------|-------------------------|
| <i>ITS</i> Employees in the U.S. | 3525 (118) | 3626 (119) |
| <i>ITS</i> Employees in rest of NA | 1785 (86) | 1840 (84) |
| <i>ITS</i> Employees in NA | 5310 (121) | 5466 (122) |

How is ITS employment distributed across the United States?

The industry survey focused generally on North American employment and requested state-by-state numbers for the U.S. Responding companies identified *ITS* employees across 43 states and the District of Columbia as of the end of CY 2009. There were only seven states (Alabama, Arkansas, Delaware, North Dakota, Vermont, West Virginia, and Wyoming) in which respondents reported no *ITS* employment. Figure E-5 depicts the relative geographic distribution of *ITS* employees by state, with color coding according to the number of *ITS* employees as of the end of CY 2009.

⁵⁴ Response rates in reported in Figure 5 include companies which indicated that they had “0” *ITS* employment in a given year. In 2008, there were 109 companies which indicated they had *ITS* employees and 12 which indicated they did not for a total of 121 responding companies. In CY 2009, there were 116 companies which indicated they had *ITS* employees and 6 which indicated that they did not for a total of 122 responding companies.

Figure E-5: ITS Employment by State among Survey Respondents (As of end of CY 2009, n=112)



What is the overall outlook for ITS employment among survey respondents?

As noted earlier in the body of this report, companies that provided employment data in the survey were more optimistic and reported more favorable CY 2009 employment than the industry overall. For the companies sharing total employment for at least two consecutive years, the projection is for more than a 12 percent increase in North American employment for CY 2010 over CY 2009 levels. Table E-5 depicts average percentage change in total employment among the various North American geographic elements for each two-year period. The parenthetical number following each percentage is the number of companies providing data for that two-year period.

Table E-5: Average Percent Change in Total Employment among Respondents

| | CY 2008-2009 | CY 2009-2010 |
|--------------------------------|---------------------|---------------------|
| Total Employment in U.S. | 8% (98) | 10%(105) |
| Total Employment in rest of NA | 6% (27) | 8% (27) |
| Total Employment in NA | 8% (105) | 13% (112) |

The North American *ITS* jobs outlook is comparatively brighter. Responding companies reported a more than 15 percent increase in employment from the end of CY 2008 to the end of CY 2009. The companies sharing projections for CY 2010 anticipate a net increase of almost 16 percent in *ITS* employment for the following year. Domestic *ITS* employment is the strongest element in this projection. Table E-6 details the average percent change in *ITS* employment for the U.S., the remainder of North America, and for the whole of North America for each two-year period. The parenthetical number following each percentage is the number of companies providing data for that two-year period.

Table E-6: Average Percent Change in *ITS* Employment among Respondents

| | CY 2008-2009 | CY 2009-2010 |
|-------------------------------------|---------------------|-------------------------|
| <i>ITS</i> employment in U.S. | 15% (105) | 13% (109) |
| <i>ITS</i> employment in rest of NA | -3% (19) | 5% (19) |
| Total <i>ITS</i> employment in NA | 15% (111) | 16% (112) ⁵⁵ |

⁵⁵ As with other average percent change calculations in this study, the calculation was based on summing variables for companies that provided data for either the U.S. or areas in North America other than the U.S. MDA researchers removed outliers, as appropriate to each calculation. The sample size therefore varied from calculation to calculation. As a result, percentages of the parts cannot be summed.

APPENDIX F — Modeling and Estimation Methodology

This appendix describes the methodology employed in the MDA modeling and market estimation.

The model does not predict the probability of a company being engaged in *ITS* production or services, but rather explains the variation in *ITS* revenue shares across the companies. Modelers have verified that all survey respondents and companies in the universe are related to *ITS*. The objective is to determine the extent of their total *ITS* contribution.⁵⁶ Responses to the MDA survey represented only a portion of all the companies active in the North American *ITS* market. It was therefore necessary to establish a process or model to provide, for each of the 3,000 *ITS*-related companies identified, accurate estimates of the percentage of each company's revenue and employment that could be attributed to *ITS*.

Due to data availability, modelers used a different approach to derive the size of the U.S. market than they did for the Canadian and Mexican markets. Similarly, the modelers used different approaches in modeling industry revenue and employment. Table F-1 describes these differing, but interconnected, approaches.

⁵⁶ A number of factors come into play in explaining why a company serves the *ITS* end-market partially or fully. As noted previously, some of the vital firm specific attributes may not be readily quantified or are not available in the public domain on a consistent basis.

Table F-1: Data Sources and Modeling Approach Used to Estimate Revenue and Employment Figures

| | | United States | Canada | Mexico |
|------------|-------------------|--|---|---|
| Revenue | Modeling approach | Used a linear regression model to predict, for each of 3,000 <i>ITS</i> -related companies identified, the share of gross revenue attributable to <i>ITS</i> . | Applied U.S. market penetration figures, derived via the regression model, to aggregated revenue figures for the target industries. | Applied U.S. market penetration figures, derived via the regression model, to aggregated revenue figures for the target industries. |
| | Data Source(s) | <ol style="list-style-type: none"> 1. MDA survey data 2. National Establishment Time-Series database 3. Global Insight’s “Business Market Insight” database 4. Global Insight’s “Industry Occupational Employment” database 5. Global Insight’s customization of Bureau of Economic Analysis’ Input-Output tables | <ol style="list-style-type: none"> 1. Results from regression model 2. Global Insight’s “World Industry Service” database | <ol style="list-style-type: none"> 1. Results from regression model 2. Global Insight’s “World Industry Service” database |
| Employment | Modeling approach | Applied productivity levels associated with each target industry to the estimated <i>ITS</i> revenue figures from the regression model. | Applied productivity levels associated with the target industries to the estimated <i>ITS</i> revenue derived for Canada. | Applied productivity levels associated with the target industries to the estimated <i>ITS</i> revenue derived for Mexico. |
| | Data Source(s) | <ol style="list-style-type: none"> 1. Results from the regression model 2. Global Insight’s “Business Market Insight” database | <ol style="list-style-type: none"> 1. Results from industry-wide revenue model for Canada 2. Global Insight’s “World Industry Service” database | <ol style="list-style-type: none"> 1. Results from industry-wide revenue model for Mexico 2. Global Insight’s “World Industry Service” database |

The Regression Model

The survey data offered variables such as geographic location, *ITS* product type, occupation break-down, wages, labor productivity, *ITS*-related patents, etc. After careful consideration of all the variables available in both the survey dataset and the universe of companies dataset, the modelers proceeded with the size, occupation, and industry specific characteristics.

Firm size is an indicator of diversification. With the increase in the size of the firm, its contribution to the *ITS* market is hypothesized to decrease. The industry specific variables, such as extent of high-tech goods and services purchases and degree of technical professionals employed, are hypothesized to relate directly to the *ITS* production process inputs and degree of high technology input composition. The extent of sales to transportation end-market is related to *ITS* market because most *ITS* products and services are consumed by the transportation sector.

The regression model referenced in Table F-1 had the following variables, specifications, and results:

Model Variables

- Percent of Revenue Attributable to *ITS* (dependent variable)⁵⁷;
- Gross Revenue (independent variable);
- Percent of High Technology Purchased Goods and Services (independent variable);
- Percent of Sales to Surface Transportation End-market (independent variable); and
- Percent of Technical Employees (independent variable).

Model Specification

The regression model was specified as the following:

$\ln(\text{FP}) = (\ln(\text{Gross Revenue}), \ln(\text{Percent of High Technology Purchased Goods and Services}), \ln(\text{Percent of Sales to Surface Transportation End-market}), \ln(\text{Percent of Technical Employees}))$

where:

$\text{FP} = \% \text{ of Revenue Attributable to } ITS / (100 - \% \text{ of Revenue Attributable to } ITS)$

$0 < \% \text{ of Revenue Attributable to } ITS < 100$

$\% \text{ of Revenue Attributable to } ITS = 100 * \text{EXP}(\text{Predicted Value} / (1 + \text{EXP}(\text{Predicted Value})))$

⁵⁷ The dependent variable in the case of *ITS* revenue is technically a transformation of the percentage.

Modeling Approach and Results

The model was specified by using company as an agent and industry indicators to appear as explanatory variables. The model was not constructed on industry-level data, but was run using the 116 companies which operated in the U.S. market and had contributed information on the share of their gross revenue attributable to *ITS*.

The coefficients⁵⁸ that result from a regression model, and which are associated with each variable in the model, can be interpreted as the size of the change in the value of the dependent variable (in this case “% of Revenue Attributable to *ITS*”) based on a one unit change in that independent variable (in this case “Gross Revenue,” “Percent of High Technology Purchased Goods and Services,” “Percent of Sales to Surface Transportation End-market,” or “Percent of Technical Employees”). Because the values of the variables used in the model were transformed by taking the log of the original values prior to running the model, the coefficients that resulted from this model can be interpreted as the percentage change in the dependent variable from a one percent change in a given independent variable. These coefficients are presented in Table F-3 below.

Once the coefficients were derived from the model, they were used to predict the percentage of each company’s revenue, stemming from business areas associated with any of the identified 86 NAICS codes, attributable to *ITS*. These predicted percentages were then applied to the portion of a company’s revenue that could be associated with any of the 86 NAICS codes which resulted in a dollar figure for that company’s revenue that was predicted to be *ITS*-related. Finally, these values were then summed to provide the total size of the U.S. *ITS* market.

Because the company-level information used as variables in the model was not available for companies with operations outside of the United States, the distribution of *ITS*-related revenue across the 86 NAICS codes was used as the basis for modeling the rest of the North American market, as outlined in Table F-1.

Descriptive statistics for the variables used in the model⁵⁹ are presented in Table F-2.

⁵⁸ Bureau of Transportation Statistics report evaluators questioned study modelers about the use of the term "coefficients." The modelers explained that the "elasticity" interpretation BTS preferred is not straight-forward in this model because the left hand side variable (the actual dependent variable) is a transformation of p (*ITS* revenue share). The left hand side variable in the equation is the log of the ratio $(p/(1-p))$.

⁵⁹ The coefficients on the two independent variables were not significant, but had the expected signs and their inclusion slightly improved the model fit. They were retained in the final model specification and used in the simulation with the companies in the universe data in expectation of improved tracking of *ITS*-related industries since the two industry specific indicators relate well with *ITS* suppliers. After carefully evaluating the in-sample and out-of-sample (universe database) simulation properties, the choice of four explanatory variables, excluding productivity, provided the most stable model with reasonable simulation property.

Table F-2: Descriptive Statistics for Model Variables

| Variable | Mean | Standard Deviation |
|---|---------------|--------------------|
| Percentage of firm revenue attributable to <i>ITS</i> | 71.35 | 37.13 |
| Company gross revenue | \$349,469,718 | \$1,735,560,203 |
| Share of industry purchases of high technology goods and services | 0.11 | 0.10 |
| Share of industry sales to transportation end-use market | 0.02 | 0.05 |
| Share of technical professionals occupations | 0.12 | 0.15 |

Table F-3 presents the results of the regression model.⁶⁰

Table F-3: Regression Results

| | Value | |
|---|-------------|---------|
| Number of observations in model | 116 | |
| R-square | 0.3915 | |
| Adjusted R-square | 0.3696 | |
| Variable | Coefficient | T-value |
| Company gross revenue | -0.65631** | -7.58 |
| Share of industry purchases of high technology goods and services | 0.75331* | 2.28 |
| Share of industry sales to transportation end-use market | 0.0956 | 0.56 |
| Share of technical professionals occupations | 0.17473 | 0.93 |

*Significant at the 95% level

**Significant at the 99% level

Estimating the Contribution of U.S. Motor Vehicle Manufacturing

Automotive manufacturers did not respond to the MDA survey—typically citing an inability to segregate *ITS* revenue/employment from total revenue/employment. This lack of primary data on the proportion of the automotive sector that could be categorized as *ITS* required that modelers estimate the motor vehicle manufacturers' contribution to the *ITS* market apart from the rest of the market. This external motor vehicle market estimation of \$4.25 billion used the approach found in Table F-4.

⁶⁰ IHS Global Insight attempted to group the respondents and differentiate manufacturing versus services industries using a dummy variable. Though it appeared to have some explanatory power, the overall contribution to the model fit was negligible and was dropped in the specification. IHS Global Insight constructed more than 15 models and relationships and explored alternative approaches of undertaking the econometric modeling approach. While not all functional forms were archived, they included binary logit models, censored regressions models, restricted least square models, and Ordinary Least Squares models using *ITS* revenues as dependent variables.

Table F-4: Steps in Motor Vehicle Market Estimation

| | |
|---|---|
| 1 | Used the Input/Output tables to evaluate all the major suppliers of the Motor Vehicle Manufacturing industry and focused on related industries based on <i>ITS</i> definition and National <i>ITS</i> Architecture. |
| 2 | Disregarded all the high technology electronics sectors, other than motor vehicles parts, which will be captured in the indirect contribution. |
| 3 | Isolated the “Motor Vehicle Parts Manufacturing” industry classification (NAICS 3363) as the industry which likely contributed the majority of <i>ITS</i> -related products to the motor vehicle industry. |
| 4 | Utilized IHS Global Insight's detailed Automotive database and disaggregated the 4-digit NAICS by 6-digit industry groupings. Selected the following main industries to be the main contributors to <i>ITS</i> -related products in the motor vehicle industry: Motor Vehicle Electrical and Electronic Equipment Manufacturing (NAICS 336322); Gross Output of \$13.8 billion All Other Motor Vehicle Parts Manufacturing (NAICS 336399); Gross Output of \$35.3 billion |
| 5 | Used Input/Output tables and IHS Global Insight Automotive databases and determined that about 50 percent of the current level of output is purchased by the “Motor Vehicle Manufacturing” industry-representing \$24.5 billion. |
| 6 | Used MDA survey data reported by automotive parts manufacturers (who reported between 6 percent and 10 percent of their total revenue was attributable to <i>ITS</i>) to determine the range of output (from Step 3) likely attributable to <i>ITS</i> . This represents between \$1.5 billion to \$2.4 billion in output. |
| 7 | Determined the percentage of the total input into the “Motor Vehicle Manufacturing” industry (\$206.3 billion) represented by the range calculated in Step 4. This suggests that the figures reached in Step 4 represent between 0.8 and 1.2 percent of total input into “Motor Vehicle Manufacturing.” |
| 8 | Applied this range of .8 to 1.2 percent to the gross output of the “Motor Vehicle Manufacturing” industry (\$250.3 billion) suggesting that between \$2 billion and \$2.8 billion of the industry’s output is attributable to <i>ITS</i> , or an average of \$2.4 billion in 2008. Estimated 2009 contribution based on industry growth rate and added in a projected increase of \$0.35 billion. |
| 9 | Added the projected 2009 value of <i>ITS</i> -related services (defined as Ford’s SYNC™ service and GM’s OnStar™ service) gained from third party research (\$1.5 billion in 2008) to arrive at total revenue of \$4.25 billion. |

Estimating Percentage of Enabling Services that are End-Use *ITS*

Among the 86 industry sub-groups that contribute to *ITS*, there are 30 industry sub-groups categorized as providing intermediate "enabling services." These services permeate most industries in the economy, including the *ITS* industries. Most of these services are also purchased to some degree by final demand segments of the economy. A portion of the estimated *ITS* enabling services are purchased by end-users of *ITS* products and services. These end-users include:

- State and local government passenger transit;
- Other state and local government consumption;
- Federal government (non-defense consumption expenditures);
- Truck transportation;
- Transit and ground passenger transportation;
- Rail transportation;
- Scenic and sightseeing transportation and support activities for transportation; and
- Couriers and messenger.

With estimates of total *ITS*-related revenue completed, this task requires the estimation of end-use expenditures for each enabling service by each end-user segment identified above.

Input/output tables published by Bureau of Economic Analysis (BEA) represent all transactions (supplier and purchaser) among all industries. The input/output data provide crucial industry specific intensity factors related to spending on technology and transportation end-market size. For this task, the input (or purchase) coefficient for each of the end-user segments noted above and all 86 *ITS* industry sub-groups for each of the enabling services industries are used to estimate end-use spending. Specifically, the enabling service's *ITS* revenue is multiplied by the appropriate input coefficient for the end-user segments and the *ITS* industries. The preliminary estimates are summed, and then the *ITS* revenues for the enabling services are reallocated to all segments and industries. The final estimates for the end-use segments noted above are extracted. The result is the amount of each enabling service's *ITS* revenue that goes to each end-user segment. The sum of the end-user purchases equals the end-use portion of the enabling services.

APPENDIX G — Listing of Target Industries

| NAICS Code | NAICS Industry |
|------------|--|
| 237130 | Power and Communication Line and Related Structures Construction |
| 237310 | Highway, Street, and Bridge Construction |
| 238210 | Electrical Contractors and Other Wiring Installation Contractors |
| 238990 | All Other Specialty Trade Contractors |
| 333314 | Optical Instrument and Lens Manufacturing |
| 333315 | Photographic and Photocopying Equipment Manufacturing |
| 333319 | Other Commercial and Service Industry Machinery Manufacturing |
| 333999 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 334111 | Electronic Computer Manufacturing |
| 334112 | Computer Storage Device Manufacturing |
| 334113 | Computer Terminal Manufacturing |
| 334119 | Other Computer Peripheral Equipment Manufacturing |
| 334210 | Telephone Apparatus Manufacturing |
| 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing |
| 334290 | Other Communications Equipment Manufacturing |
| 334310 | Audio and Video Equipment Manufacturing |
| 334411 | Electron Tube Manufacturing |
| 334412 | Bare Printed Circuit Board Manufacturing |
| 334413 | Semiconductor and Related Device Manufacturing |
| 334414 | Electronic Capacitor Manufacturing |
| 334415 | Electronic Resistor Manufacturing |
| 334416 | Electronic Coil, Transformer, and Other Inductor Manufacturing |
| 334417 | Electronic Connector Manufacturing |
| 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing |
| 334419 | Other Electronic Component Manufacturing |
| 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing |
| 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use |
| 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables |
| 334514 | Totalizing Fluid Meter and Counting Device Manufacturing |
| 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals |
| 334516 | Analytical Laboratory Instrument Manufacturing |
| 334517 | Irradiation Apparatus Manufacturing |
| 334518 | Watch, Clock, and Part Manufacturing |
| 334519 | Other Measuring and Controlling Device Manufacturing |
| 335122 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing |
| 335311 | Power, Distribution, and Specialty Transformer Manufacturing |
| 335314 | Relay and Industrial Control Manufacturing |
| 335921 | Fiber Optic Cable Manufacturing |
| 335929 | Other Communication and Energy Wire Manufacturing |
| 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing |
| 336321 | Vehicular Lighting Equipment Manufacturing |
| 336322 | Other Motor Vehicle Electrical and Electronic Equipment Manufacturing |
| 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing |
| 336340 | Motor Vehicle Brake System Manufacturing |
| 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing |

| NAICS Code | NAICS Industry |
|------------|---|
| 336399 | All Other Motor Vehicle Parts Manufacturing |
| 339950 | Sign Manufacturing |
| 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers |
| 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers |
| 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers |
| 423620 | Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers |
| 423690 | Other Electronic Parts and Equipment Merchant Wholesalers |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers |
| 488111 | Air Traffic Control |
| 488210 | Support Activities for Rail Transportation |
| 488330 | Navigational Services to Shipping |
| 488490 | Other Support Activities for Road Transportation |
| 488999 | All Other Support Activities for Transportation |
| 515111 | Radio Networks |
| 517110 | Wired Telecommunications Carriers |
| 517210 | Wireless Telecommunications Carriers (except Satellite) |
| 517410 | Satellite Telecommunications |
| 517911 | Telecommunications Resellers |
| 517919 | All Other Telecommunications |
| 518210 | Data Processing, Hosting, and Related Services |
| 541310 | Architectural Services |
| 541330 | Engineering Services |
| 541340 | Drafting Services |
| 541370 | Surveying and Mapping (except Geophysical) Services |
| 541511 | Custom Computer Programming Services |
| 541512 | Computer Systems Design Services |
| 541513 | Computer Facilities Management Services |
| 541519 | Other Computer Related Services |
| 541611 | Administrative Management and General Management Consulting Services |
| 541614 | Process, Physical Distribution, and Logistics Consulting Services |
| 541618 | Other Management Consulting Services |
| 541690 | Other Scientific and Technical Consulting Services |
| 541712 | Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) |
| 541820 | Public Relations Agencies |
| 541990 | All Other Professional, Scientific, and Technical Services |
| 561110 | Office Administrative Services |
| 561499 | All Other Business Support Services |
| 561990 | All Other Support Services |
| 811212 | Computer and Office Machine Repair and Maintenance |
| 811213 | Communication Equipment Repair and Maintenance |
| 811219 | Other Electronic and Precision Equipment Repair and Maintenance |

APPENDIX H — Additional *ITS* Industry Information Derived from the Model

This appendix includes the following tables/figures derived from the economic model and estimations:

Table H-1: U.S. *ITS* Revenues by NAICS Industry (ranked on CY 2009 end-use *ITS*)

Table H-2: U.S. *ITS* End- Use Revenue Shares of Total U.S. Output by Industry (ranked on CY 2009)

Table H-3: U.S. *ITS* Employment by NAICs industry, ranked on CY 2009 end-use *ITS*

Table H-4: U.S. *ITS* Employment Shares of Total U.S. Employment by Industry—ranked on CY 2009 end-use *ITS*

Table H-5: U.S. *ITS* Revenue by State, ranked on CY 2009 end-use *ITS*

Table H-6: U.S. *ITS*-related Revenue Categorized by NAICS Code and Market Segment (CY 2009)

Table H-7: *ITS* Total Value Chain Employment by State (ranked on CY 2009)

Table H-1: U.S. ITS Revenues by NAICS Industry (in billions of USD, ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|--|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 541512 | Computer Systems Design Services | 5.10 | (8.93) | 4.94 | (8.65) | 5.22 | (9.14) | 5.59 | (9.78) | 5.95 | (10.41) | 6.26 | (10.95) | 6.54 | (11.44) | 6.81 | (11.93) |
| 3361_2 | Auto Manufacturing | 3.88 | (3.88) | 4.25 | (4.25) | 5.29 | (5.29) | 5.93 | (5.93) | 6.65 | (6.65) | 7.20 | (7.2) | 7.75 | (7.75) | 8.37 | (8.37) |
| 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing | 3.33 | (3.33) | 3.13 | (3.13) | 3.28 | (3.28) | 3.41 | (3.41) | 3.64 | (3.64) | 3.80 | (3.8) | 3.99 | (3.99) | 4.14 | (4.14) |
| 517110 | Wired Telecommunications Carriers | 3.17 | (13.96) | 3.06 | (13.45) | 3.13 | (13.78) | 3.27 | (14.4) | 3.41 | (14.98) | 3.48 | (15.33) | 3.58 | (15.73) | 3.65 | (16.06) |
| 334111 | Electronic Computer Manufacturing | 3.01 | (3.01) | 2.90 | (2.9) | 2.96 | (2.96) | 3.11 | (3.11) | 3.34 | (3.34) | 3.54 | (3.54) | 3.70 | (3.7) | 3.89 | (3.89) |
| 541511 | Custom Computer Programming Services | 2.55 | (6.55) | 2.47 | (6.35) | 2.60 | (6.69) | 2.78 | (7.15) | 2.97 | (7.62) | 3.13 | (8.04) | 3.29 | (8.44) | 3.45 | (8.85) |
| 518210 | Data Processing, Hosting, and Related Services | 2.10 | (4.81) | 2.07 | (4.74) | 2.16 | (4.94) | 2.27 | (5.18) | 2.39 | (5.45) | 2.48 | (5.68) | 2.57 | (5.88) | 2.65 | (6.05) |
| 541330 | Engineering Services | 1.68 | (11.4) | 1.64 | (11.11) | 1.67 | (11.29) | 1.77 | (11.97) | 1.89 | (12.83) | 2.00 | (13.56) | 2.10 | (14.23) | 2.20 | (14.88) |
| 238210 | Electrical Contractors and Other Wiring Installation Contractors | 1.52 | (1.52) | 1.47 | (1.47) | 1.43 | (1.43) | 1.53 | (1.53) | 1.70 | (1.7) | 1.81 | (1.81) | 1.90 | (1.9) | 1.98 | (1.98) |
| 334210 | Telephone Apparatus Manufacturing | 1.54 | (1.54) | 1.45 | (1.45) | 1.52 | (1.52) | 1.56 | (1.56) | 1.66 | (1.66) | 1.73 | (1.73) | 1.81 | (1.81) | 1.88 | (1.88) |
| 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing | 1.43 | (4.78) | 1.42 | (4.75) | 1.49 | (4.96) | 1.56 | (5.21) | 1.68 | (5.6) | 1.77 | (5.91) | 1.86 | (6.21) | 1.95 | (6.49) |
| 517210 | Wireless Telecommunications Carriers (except Satellite) | 1.22 | (5.38) | 1.21 | (5.34) | 1.28 | (5.61) | 1.36 | (5.99) | 1.46 | (6.41) | 1.53 | (6.71) | 1.60 | (7.06) | 1.67 | (7.37) |
| 237310 | Highway, Street, and Bridge Construction | 1.20 | (1.2) | 1.18 | (1.18) | 1.16 | (1.16) | 1.23 | (1.23) | 1.37 | (1.37) | 1.47 | (1.47) | 1.55 | (1.55) | 1.62 | (1.62) |
| 334119 | Other Computer Peripheral Equipment Manufacturing | 1.19 | (1.19) | 1.16 | (1.16) | 1.19 | (1.19) | 1.26 | (1.26) | 1.35 | (1.35) | 1.43 | (1.43) | 1.50 | (1.5) | 1.58 | (1.58) |
| 334290 | Other Communications Equipment Manufacturing | 1.01 | (1.01) | 0.94 | (0.94) | 0.99 | (0.99) | 1.04 | (1.04) | 1.11 | (1.11) | 1.17 | (1.17) | 1.22 | (1.22) | 1.26 | (1.26) |
| 541614 | Process, Physical Distribution, and Logistics Consulting Services | 0.93 | (0.93) | 0.93 | (0.93) | 0.97 | (0.97) | 1.05 | (1.05) | 1.15 | (1.15) | 1.23 | (1.23) | 1.30 | (1.3) | 1.35 | (1.35) |
| 334519 | Other Measuring and Controlling Device Manufacturing | 0.72 | (0.97) | 0.73 | (0.99) | 0.76 | (1.02) | 0.79 | (1.07) | 0.84 | (1.14) | 0.89 | (1.2) | 0.93 | (1.26) | 0.97 | (1.31) |
| 811219 | Other Electronic and Precision Equipment Repair and Maintenance | 0.71 | (0.96) | 0.70 | (0.94) | 0.72 | (0.98) | 0.77 | (1.04) | 0.82 | (1.12) | 0.87 | (1.17) | 0.91 | (1.23) | 0.95 | (1.29) |
| 237130 | Power and Communication Line and Related Structures Construction | 0.70 | (0.7) | 0.68 | (0.68) | 0.67 | (0.67) | 0.71 | (0.71) | 0.80 | (0.8) | 0.86 | (0.86) | 0.91 | (0.91) | 0.95 | (0.95) |
| 811212 | Computer and Office Machine Repair and Maintenance | 0.67 | (0.91) | 0.66 | (0.9) | 0.69 | (0.93) | 0.73 | (0.98) | 0.77 | (1.04) | 0.81 | (1.09) | 0.85 | (1.15) | 0.88 | (1.2) |
| 541690 | Other Scientific and Technical Consulting Services | 0.65 | (1.1) | 0.65 | (1.1) | 0.68 | (1.15) | 0.73 | (1.24) | 0.80 | (1.36) | 0.87 | (1.47) | 0.92 | (1.55) | 0.96 | (1.62) |
| 541370 | Surveying and Mapping (except Geophysical) Services | 0.58 | (0.58) | 0.56 | (0.56) | 0.57 | (0.57) | 0.61 | (0.61) | 0.65 | (0.65) | 0.69 | (0.69) | 0.73 | (0.73) | 0.77 | (0.77) |
| 334310 | Audio and Video Equipment Manufacturing | 0.63 | (0.63) | 0.55 | (0.55) | 0.59 | (0.59) | 0.66 | (0.66) | 0.76 | (0.76) | 0.84 | (0.84) | 0.89 | (0.89) | 0.95 | (0.95) |
| 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables | 0.52 | (1.22) | 0.53 | (1.22) | 0.55 | (1.28) | 0.58 | (1.36) | 0.63 | (1.46) | 0.67 | (1.55) | 0.70 | (1.62) | 0.73 | (1.7) |
| 334112 | Computer Storage Device Manufacturing | 0.46 | (0.46) | 0.44 | (0.44) | 0.45 | (0.45) | 0.47 | (0.47) | 0.50 | (0.5) | 0.53 | (0.53) | 0.55 | (0.55) | 0.57 | (0.57) |

Table H-1: U.S. ITS Revenues by NAICS Industry (in billions of USD, ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|---|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers | 0.47 | (2.08) | 0.44 | (1.95) | 0.46 | (2.01) | 0.49 | (2.15) | 0.52 | (2.3) | 0.55 | (2.42) | 0.57 | (2.52) | 0.59 | (2.62) |
| 334113 | Computer Terminal Manufacturing | 0.42 | (0.42) | 0.41 | (0.41) | 0.41 | (0.41) | 0.43 | (0.43) | 0.45 | (0.45) | 0.48 | (0.48) | 0.51 | (0.51) | 0.53 | (0.53) |
| 541611 | Administrative Management and General Management Consulting Services | 0.42 | (1.17) | 0.41 | (1.17) | 0.43 | (1.22) | 0.47 | (1.31) | 0.51 | (1.43) | 0.54 | (1.53) | 0.57 | (1.61) | 0.60 | (1.68) |
| 541519 | Other Computer Related Services | 0.40 | (0.97) | 0.39 | (0.94) | 0.41 | (0.99) | 0.44 | (1.06) | 0.46 | (1.12) | 0.49 | (1.18) | 0.51 | (1.23) | 0.53 | (1.28) |
| 238990 | All Other Specialty Trade Contractors | 0.38 | (0.38) | 0.38 | (0.38) | 0.37 | (0.37) | 0.40 | (0.4) | 0.44 | (0.44) | 0.47 | (0.47) | 0.49 | (0.49) | 0.51 | (0.51) |
| 561110 | Office Administrative Services | 0.39 | (1.03) | 0.38 | (1) | 0.40 | (1.06) | 0.43 | (1.14) | 0.46 | (1.21) | 0.48 | (1.27) | 0.50 | (1.33) | 0.52 | (1.38) |
| 339950 | Sign Manufacturing | 0.37 | (0.37) | 0.36 | (0.36) | 0.37 | (0.37) | 0.40 | (0.4) | 0.43 | (0.43) | 0.46 | (0.46) | 0.48 | (0.48) | 0.50 | (0.5) |
| 488210 | Support Activities for Rail Transportation | 0.36 | (0.36) | 0.36 | (0.36) | 0.38 | (0.38) | 0.40 | (0.4) | 0.42 | (0.42) | 0.44 | (0.44) | 0.46 | (0.46) | 0.49 | (0.49) |
| 515111 | Radio Networks | 0.37 | (0.37) | 0.36 | (0.36) | 0.38 | (0.38) | 0.39 | (0.39) | 0.42 | (0.42) | 0.43 | (0.43) | 0.45 | (0.45) | 0.47 | (0.47) |
| 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing | 0.35 | (0.35) | 0.34 | (0.34) | 0.36 | (0.36) | 0.39 | (0.39) | 0.44 | (0.44) | 0.47 | (0.47) | 0.50 | (0.5) | 0.51 | (0.51) |
| 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers | 0.34 | (1.48) | 0.32 | (1.4) | 0.33 | (1.44) | 0.35 | (1.54) | 0.37 | (1.64) | 0.39 | (1.73) | 0.41 | (1.8) | 0.42 | (1.87) |
| 423690 | Other Electronic Parts and Equipment Merchant Wholesalers | 0.34 | (1.51) | 0.32 | (1.41) | 0.33 | (1.45) | 0.35 | (1.54) | 0.38 | (1.66) | 0.40 | (1.74) | 0.41 | (1.81) | 0.43 | (1.88) |
| 517919 | All Other Telecommunications | 0.32 | (1.41) | 0.32 | (1.4) | 0.33 | (1.46) | 0.35 | (1.52) | 0.36 | (1.59) | 0.37 | (1.64) | 0.39 | (1.72) | 0.40 | (1.78) |
| 811213 | Communication Equipment Repair and Maintenance | 0.32 | (0.44) | 0.32 | (0.43) | 0.33 | (0.45) | 0.35 | (0.47) | 0.37 | (0.5) | 0.39 | (0.53) | 0.41 | (0.56) | 0.43 | (0.59) |
| 336340 | Motor Vehicle Brake System Manufacturing | 0.31 | (0.31) | 0.30 | (0.3) | 0.31 | (0.31) | 0.34 | (0.34) | 0.39 | (0.39) | 0.41 | (0.41) | 0.43 | (0.43) | 0.44 | (0.44) |
| 488490 | Other Support Activities for Road Transportation | 0.24 | (0.24) | 0.24 | (0.24) | 0.26 | (0.26) | 0.28 | (0.28) | 0.29 | (0.29) | 0.31 | (0.31) | 0.32 | (0.32) | 0.34 | (0.34) |
| 561990 | All Other Support Services | 0.25 | (0.69) | 0.24 | (0.65) | 0.25 | (0.69) | 0.27 | (0.73) | 0.29 | (0.78) | 0.30 | (0.81) | 0.31 | (0.85) | 0.32 | (0.88) |
| 333314 | Optical Instrument and Lens Manufacturing | 0.20 | (0.28) | 0.19 | (0.28) | 0.20 | (0.29) | 0.21 | (0.31) | 0.23 | (0.33) | 0.24 | (0.34) | 0.25 | (0.35) | 0.25 | (0.36) |
| 541513 | Computer Facilities Management Services | 0.20 | (0.49) | 0.19 | (0.47) | 0.20 | (0.49) | 0.21 | (0.52) | 0.22 | (0.54) | 0.24 | (0.57) | 0.24 | (0.59) | 0.25 | (0.61) |
| 335314 | Relay and Industrial Control Manufacturing | 0.20 | (1.01) | 0.18 | (0.91) | 0.19 | (0.93) | 0.20 | (0.99) | 0.22 | (1.08) | 0.23 | (1.14) | 0.24 | (1.19) | 0.25 | (1.23) |
| 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing | 0.18 | (0.18) | 0.18 | (0.18) | 0.18 | (0.18) | 0.21 | (0.21) | 0.23 | (0.23) | 0.25 | (0.25) | 0.26 | (0.26) | 0.26 | (0.26) |
| 541618 | Other Management Consulting Services | 0.17 | (0.48) | 0.17 | (0.47) | 0.18 | (0.5) | 0.19 | (0.54) | 0.21 | (0.59) | 0.22 | (0.63) | 0.24 | (0.67) | 0.25 | (0.69) |
| 517911 | Telecommunications Resellers | 0.16 | (0.71) | 0.16 | (0.71) | 0.17 | (0.74) | 0.17 | (0.77) | 0.18 | (0.81) | 0.19 | (0.84) | 0.20 | (0.88) | 0.21 | (0.92) |
| 541310 | Architectural Services | 0.16 | (1.11) | 0.16 | (1.09) | 0.16 | (1.11) | 0.17 | (1.18) | 0.19 | (1.27) | 0.20 | (1.34) | 0.21 | (1.41) | 0.22 | (1.48) |
| 335122 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing | 0.14 | (0.14) | 0.14 | (0.14) | 0.14 | (0.14) | 0.15 | (0.15) | 0.17 | (0.17) | 0.18 | (0.18) | 0.18 | (0.18) | 0.19 | (0.19) |
| 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers | 0.13 | (0.58) | 0.12 | (0.55) | 0.13 | (0.56) | 0.14 | (0.6) | 0.15 | (0.64) | 0.15 | (0.67) | 0.16 | (0.7) | 0.17 | (0.73) |

Table H-1: U.S. ITS Revenues by NAICS Industry (in billions of USD, ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|--|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 517410 | Satellite Telecommunications | 0.12 | (0.54) | 0.12 | (0.53) | 0.12 | (0.55) | 0.13 | (0.56) | 0.14 | (0.6) | 0.14 | (0.62) | 0.15 | (0.64) | 0.15 | (0.67) |
| 333315 | Photographic and Photocopying Equipment Manufacturing | 0.11 | (0.11) | 0.11 | (0.11) | 0.11 | (0.11) | 0.12 | (0.12) | 0.13 | (0.13) | 0.14 | (0.14) | 0.14 | (0.14) | 0.15 | (0.15) |
| 561499 | All Other Business Support Services | 0.10 | (0.47) | 0.10 | (0.47) | 0.11 | (0.49) | 0.11 | (0.53) | 0.12 | (0.56) | 0.13 | (0.59) | 0.13 | (0.62) | 0.14 | (0.65) |
| 423620 | Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers | 0.10 | (0.42) | 0.09 | (0.4) | 0.09 | (0.41) | 0.10 | (0.43) | 0.11 | (0.46) | 0.11 | (0.49) | 0.12 | (0.51) | 0.12 | (0.53) |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 0.08 | (0.34) | 0.07 | (0.33) | 0.08 | (0.34) | 0.08 | (0.36) | 0.09 | (0.39) | 0.09 | (0.42) | 0.10 | (0.44) | 0.10 | (0.46) |
| 488330 | Navigational Services to Shipping | 0.07 | (0.07) | 0.07 | (0.07) | 0.07 | (0.07) | 0.07 | (0.07) | 0.08 | (0.08) | 0.08 | (0.08) | 0.09 | (0.09) | 0.09 | (0.09) |
| 541990 | All Other Professional, Scientific, and Technical Services | 0.07 | (0.37) | 0.07 | (0.36) | 0.07 | (0.37) | 0.07 | (0.39) | 0.08 | (0.41) | 0.08 | (0.43) | 0.08 | (0.45) | 0.09 | (0.46) |
| 488999 | All Other Support Activities for Transportation | 0.06 | (0.06) | 0.06 | (0.06) | 0.06 | (0.06) | 0.07 | (0.07) | 0.07 | (0.07) | 0.07 | (0.07) | 0.08 | (0.08) | 0.08 | (0.08) |
| 541820 | Public Relations Agencies | 0.06 | (0.35) | 0.06 | (0.33) | 0.06 | (0.34) | 0.06 | (0.37) | 0.07 | (0.4) | 0.07 | (0.42) | 0.08 | (0.45) | 0.08 | (0.47) |
| 541340 | Drafting Services | 0.02 | (0.17) | 0.02 | (0.16) | 0.02 | (0.17) | 0.03 | (0.18) | 0.03 | (0.19) | 0.03 | (0.21) | 0.03 | (0.22) | 0.03 | (0.23) |
| 333319 | Other Commercial and Service Industry Machinery Manufacturing | 0.00 | (0.36) | 0.00 | (0.35) | 0.00 | (0.36) | 0.00 | (0.39) | 0.00 | (0.42) | 0.00 | (0.44) | 0.00 | (0.46) | 0.00 | (0.48) |
| 333999 | All Other Miscellaneous General Purpose Machinery Manufacturing | 0.00 | (0.27) | 0.00 | (0.25) | 0.00 | (0.26) | 0.00 | (0.27) | 0.00 | (0.3) | 0.00 | (0.32) | 0.00 | (0.33) | 0.00 | (0.34) |
| 334411 | Electron Tube Manufacturing | 0.00 | (0.08) | 0.00 | (0.08) | 0.00 | (0.08) | 0.00 | (0.09) | 0.00 | (0.1) | 0.00 | (0.1) | 0.00 | (0.11) | 0.00 | (0.12) |
| 334412 | Bare Printed Circuit Board Manufacturing | 0.00 | (0.4) | 0.00 | (0.37) | 0.00 | (0.39) | 0.00 | (0.41) | 0.00 | (0.45) | 0.00 | (0.48) | 0.00 | (0.51) | 0.00 | (0.53) |
| 334413 | Semiconductor and Related Device Manufacturing | 0.00 | (2.17) | 0.00 | (1.99) | 0.00 | (2.08) | 0.00 | (2.22) | 0.00 | (2.46) | 0.00 | (2.61) | 0.00 | (2.75) | 0.00 | (2.87) |
| 334414 | Electronic Capacitor Manufacturing | 0.00 | (0.1) | 0.00 | (0.1) | 0.00 | (0.1) | 0.00 | (0.11) | 0.00 | (0.12) | 0.00 | (0.13) | 0.00 | (0.14) | 0.00 | (0.15) |
| 334415 | Electronic Resistor Manufacturing | 0.00 | (0.08) | 0.00 | (0.08) | 0.00 | (0.08) | 0.00 | (0.09) | 0.00 | (0.1) | 0.00 | (0.11) | 0.00 | (0.11) | 0.00 | (0.12) |
| 334416 | Electronic Coil, Transformer, and Other Inductor Manufacturing | 0.00 | (0.18) | 0.00 | (0.16) | 0.00 | (0.17) | 0.00 | (0.18) | 0.00 | (0.2) | 0.00 | (0.22) | 0.00 | (0.23) | 0.00 | (0.24) |
| 334417 | Electronic Connector Manufacturing | 0.00 | (0.47) | 0.00 | (0.44) | 0.00 | (0.46) | 0.00 | (0.5) | 0.00 | (0.55) | 0.00 | (0.59) | 0.00 | (0.62) | 0.00 | (0.66) |
| 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing | 0.00 | (0.99) | 0.00 | (0.89) | 0.00 | (0.94) | 0.00 | (1.02) | 0.00 | (1.15) | 0.00 | (1.24) | 0.00 | (1.31) | 0.00 | (1.38) |
| 334419 | Other Electronic Component Manufacturing | 0.00 | (1.1) | 0.00 | (1) | 0.00 | (1.07) | 0.00 | (1.15) | 0.00 | (1.27) | 0.00 | (1.36) | 0.00 | (1.44) | 0.00 | (1.51) |
| 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use | 0.00 | (0.34) | 0.00 | (0.35) | 0.00 | (0.37) | 0.00 | (0.39) | 0.00 | (0.42) | 0.00 | (0.44) | 0.00 | (0.46) | 0.00 | (0.49) |
| 334514 | Totalizing Fluid Meter and Counting Device Manufacturing | 0.00 | (0.23) | 0.00 | (0.24) | 0.00 | (0.25) | 0.00 | (0.26) | 0.00 | (0.29) | 0.00 | (0.31) | 0.00 | (0.32) | 0.00 | (0.34) |
| 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals | 0.00 | (0.93) | 0.00 | (0.93) | 0.00 | (0.97) | 0.00 | (1.02) | 0.00 | (1.11) | 0.00 | (1.18) | 0.00 | (1.24) | 0.00 | (1.3) |
| 334516 | Analytical Laboratory Instrument Manufacturing | 0.00 | (0.34) | 0.00 | (0.35) | 0.00 | (0.36) | 0.00 | (0.38) | 0.00 | (0.4) | 0.00 | (0.43) | 0.00 | (0.45) | 0.00 | (0.47) |
| 334517 | Irradiation Apparatus Manufacturing | 0.00 | (0.32) | 0.00 | (0.32) | 0.00 | (0.34) | 0.00 | (0.35) | 0.00 | (0.38) | 0.00 | (0.4) | 0.00 | (0.42) | 0.00 | (0.43) |

Table H-1: U.S. ITS Revenues by NAICS Industry (in billions of USD, ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|--------------|--|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 334518 | Watch, Clock, and Part Manufacturing | 0.00 | (0.05) | 0.00 | (0.05) | 0.00 | (0.05) | 0.00 | (0.06) | 0.00 | (0.06) | 0.00 | (0.06) | 0.00 | (0.07) | 0.00 | (0.07) |
| 335311 | Power, Distribution, and Specialty Transformer Manufacturing | 0.00 | (0.22) | 0.00 | (0.2) | 0.00 | (0.21) | 0.00 | (0.22) | 0.00 | (0.24) | 0.00 | (0.25) | 0.00 | (0.26) | 0.00 | (0.27) |
| 335921 | Fiber Optic Cable Manufacturing | 0.00 | (0.12) | 0.00 | (0.11) | 0.00 | (0.12) | 0.00 | (0.12) | 0.00 | (0.13) | 0.00 | (0.14) | 0.00 | (0.14) | 0.00 | (0.15) |
| 335929 | Other Communication and Energy Wire Manufacturing | 0.00 | (0.36) | 0.00 | (0.35) | 0.00 | (0.35) | 0.00 | (0.37) | 0.00 | (0.39) | 0.00 | (0.41) | 0.00 | (0.42) | 0.00 | (0.43) |
| 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing | 0.00 | (0.88) | 0.00 | (0.8) | 0.00 | (0.82) | 0.00 | (0.87) | 0.00 | (0.95) | 0.00 | (1) | 0.00 | (1.05) | 0.00 | (1.09) |
| 336321 | Vehicular Lighting Equipment Manufacturing | 0.00 | (0.14) | 0.00 | (0.14) | 0.00 | (0.14) | 0.00 | (0.16) | 0.00 | (0.18) | 0.00 | (0.19) | 0.00 | (0.2) | 0.00 | (0.2) |
| 336322 | Other Motor Vehicle Electrical and Electronic Equipment Manufacturing | 0.00 | (0.52) | 0.00 | (0.5) | 0.00 | (0.52) | 0.00 | (0.57) | 0.00 | (0.64) | 0.00 | (0.69) | 0.00 | (0.72) | 0.00 | (0.74) |
| 336399 | All Other Motor Vehicle Parts Manufacturing | 0.00 | (1.95) | 0.00 | (1.88) | 0.00 | (1.95) | 0.00 | (2.14) | 0.00 | (2.39) | 0.00 | (2.55) | 0.00 | (2.65) | 0.00 | (2.73) |
| 488111 | Air Traffic Control | 0.00 | (0.01) | 0.00 | (0.01) | 0.00 | (0.01) | 0.00 | (0.02) | 0.00 | (0.02) | 0.00 | (0.02) | 0.00 | (0.02) | 0.00 | (0.02) |
| Total | | 48.88 | (114.99) | 47.89 | (111.81) | 50.46 | (116.72) | 53.81 | (124.16) | 57.98 | (133.27) | 61.27 | (140.41) | 64.34 | (146.95) | 67.29 | (153.14) |

Table H-2: U.S. End-Use /ITS Revenue Shares of Total U.S. Output by Industry (ranked on CY 2009)

| Rank | NAICS Code | NAICS Title | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 334290 | Other Communications Equipment Manufacturing | 14.7% | 15.4% | 15.1% | 15.5% | 16.2% | 16.6% | 17.0% | 17.4% |
| 2 | 334111 | Electronic Computer Manufacturing | 8.8% | 10.3% | 11.9% | 12.5% | 13.1% | 13.5% | 13.9% | 14.8% |
| 3 | 488210 | Support Activities for Rail Transportation | 9.8% | 10.0% | 9.8% | 9.7% | 9.8% | 9.9% | 10.0% | 10.1% |
| 4 | 334310 | Audio and Video Equipment Manufacturing | 8.3% | 9.3% | 9.2% | 8.6% | 8.1% | 7.7% | 7.4% | 7.2% |
| 5 | 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing | 8.7% | 9.3% | 9.0% | 9.0% | 9.3% | 9.3% | 9.4% | 9.5% |
| 6 | 334119 | Other Computer Peripheral Equipment Manufacturing | 8.7% | 9.0% | 8.9% | 8.9% | 9.1% | 9.1% | 9.2% | 9.3% |
| 7 | 488490 | Other Support Activities for Road Transportation | 8.5% | 8.6% | 8.4% | 8.4% | 8.6% | 8.7% | 8.6% | 8.6% |
| 8 | 334210 | Telephone Apparatus Manufacturing | 7.6% | 8.3% | 7.9% | 7.8% | 7.9% | 8.0% | 8.1% | 8.1% |
| 9 | 334112 | Computer Storage Device Manufacturing | 7.6% | 8.3% | 8.0% | 8.1% | 8.1% | 8.1% | 8.2% | 8.3% |
| 10 | 541614 | Process, Physical Distribution, and Logistics Consulting Services | 7.3% | 7.2% | 7.2% | 7.3% | 7.2% | 7.0% | 7.0% | 7.1% |
| 11 | 515111 | Radio Networks | 7.2% | 6.9% | 6.9% | 6.9% | 6.8% | 6.8% | 6.7% | 6.6% |
| 12 | 334113 | Computer Terminal Manufacturing | 7.1% | 6.9% | 6.5% | 6.5% | 6.5% | 6.6% | 6.6% | 6.6% |
| 13 | 333315 | Photographic and Photocopying Equipment Manufacturing | 7.0% | 6.8% | 6.7% | 6.8% | 7.1% | 7.3% | 7.5% | 7.8% |
| 14 | 334519 | Other Measuring and Controlling Device Manufacturing | 6.7% | 6.4% | 6.3% | 6.3% | 6.4% | 6.4% | 6.4% | 6.5% |
| 15 | 811213 | Communication Equipment Repair and Maintenance | 6.4% | 6.4% | 6.5% | 6.6% | 6.8% | 7.0% | 7.1% | 7.2% |
| 16 | 333314 | Optical Instrument and Lens Manufacturing | 5.4% | 5.3% | 5.1% | 4.9% | 4.9% | 5.0% | 5.0% | 5.2% |
| 17 | 336340 | Motor Vehicle Brake System Manufacturing | 4.2% | 4.9% | 5.0% | 4.8% | 4.6% | 4.6% | 4.7% | 4.9% |
| 18 | 541370 | Surveying and Mapping (except Geophysical) Services | 4.7% | 4.9% | 5.1% | 5.1% | 5.1% | 5.2% | 5.2% | 5.3% |
| 19 | 811219 | Other Electronic and Precision Equipment Repair and Maintenance | 4.8% | 4.7% | 4.7% | 4.7% | 4.7% | 4.8% | 4.7% | 4.7% |
| 20 | 335122 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing | 3.8% | 4.0% | 3.9% | 3.9% | 3.9% | 3.9% | 4.0% | 4.1% |
| 21 | 488999 | All Other Support Activities for Transportation | 3.6% | 3.8% | 3.8% | 3.9% | 3.9% | 4.1% | 4.1% | 4.2% |
| 22 | 811212 | Computer and Office Machine Repair and Maintenance | 3.8% | 3.7% | 3.8% | 3.9% | 4.0% | 4.1% | 4.2% | 4.3% |

Table H-2: U.S. End-Use /ITS Revenue Shares of Total U.S. Output by Industry (ranked on CY 2009)

| Rank | NAICS Code | NAICS Title | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------------|--|------|------|------|------|------|------|------|------|
| 23 | 518210 | Data Processing, Hosting, and Related Services | 3.6% | 3.7% | 3.6% | 3.6% | 3.6% | 3.6% | 3.7% | 3.8% |
| 24 | 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables | 3.8% | 3.7% | 3.6% | 3.7% | 3.8% | 3.8% | 3.8% | 3.8% |
| 25 | 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing | 3.3% | 3.3% | 3.3% | 3.2% | 3.3% | 3.3% | 3.3% | 3.3% |
| 26 | 488330 | Navigational Services to Shipping | 3.3% | 3.3% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% |
| 27 | 541512 | Computer Systems Design Services | 3.2% | 3.3% | 3.2% | 3.3% | 3.3% | 3.4% | 3.4% | 3.4% |
| 28 | 541618 | Other Management Consulting Services | 3.1% | 3.0% | 3.0% | 3.0% | 3.0% | 2.9% | 2.9% | 2.9% |
| 29 | 541690 | Other Scientific and Technical Consulting Services | 2.8% | 2.8% | 2.8% | 2.8% | 2.7% | 2.7% | 2.6% | 2.7% |
| 30 | 3361_2 | Auto Manufacturing | 1.7% | 2.6% | 3.2% | 2.9% | 2.7% | 2.7% | 2.8% | 3.0% |
| 31 | 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing | 2.2% | 2.6% | 2.6% | 2.5% | 2.5% | 2.5% | 2.6% | 2.7% |
| 32 | 335314 | Relay and Industrial Control Manufacturing | 1.8% | 2.2% | 2.3% | 2.3% | 2.3% | 2.4% | 2.5% | 2.6% |
| 33 | 237310 | Highway, Street, and Bridge Construction | 1.9% | 2.1% | 2.2% | 2.1% | 2.0% | 1.9% | 1.9% | 1.9% |
| 34 | 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing | 1.8% | 2.1% | 2.1% | 2.0% | 2.0% | 2.0% | 2.0% | 2.1% |
| 35 | 237130 | Power and Communication Line and Related Structures Construction | 1.8% | 2.1% | 2.1% | 2.0% | 1.9% | 1.8% | 1.8% | 1.8% |
| 36 | 339950 | Sign Manufacturing | 1.8% | 1.9% | 1.8% | 1.8% | 1.8% | 1.8% | 1.8% | 1.8% |
| 37 | 517410 | Satellite Telecommunications | 1.9% | 1.9% | 1.9% | 1.9% | 2.0% | 2.0% | 2.1% | 2.1% |
| 38 | 541511 | Custom Computer Programming Services | 1.6% | 1.6% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% | 1.5% |
| 39 | 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers | 1.5% | 1.5% | 1.5% | 1.5% | 1.6% | 1.6% | 1.6% | 1.6% |
| 40 | 561499 | All Other Business Support Services | 1.2% | 1.2% | 1.2% | 1.2% | 1.2% | 1.2% | 1.2% | 1.2% |
| 41 | 517919 | All Other Telecommunications | 1.2% | 1.2% | 1.2% | 1.3% | 1.3% | 1.4% | 1.4% | 1.4% |
| 42 | 423620 | Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers | 1.1% | 1.2% | 1.2% | 1.2% | 1.3% | 1.3% | 1.3% | 1.3% |
| 43 | 541519 | Other Computer Related Services | 1.1% | 1.1% | 1.1% | 1.1% | 1.1% | 1.1% | 1.1% | 1.1% |
| 44 | 238210 | Electrical Contractors and Other Wiring Installation Contractors | 0.9% | 1.1% | 1.1% | 1.1% | 1.0% | 1.0% | 1.0% | 1.0% |

Table H-2: U.S. End-Use /ITS Revenue Shares of Total U.S. Output by Industry (ranked on CY 2009)

| Rank | NAICS Code | NAICS Title | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------------|---|------|------|------|------|------|------|------|------|
| 45 | 517210 | Wireless Telecommunications Carriers (except Satellite) | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.1% | 1.1% | 1.1% |
| 46 | 517911 | Telecommunications Resellers | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.1% | 1.1% |
| 47 | 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 0.9% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| 48 | 541330 | Engineering Services | 0.9% | 0.9% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| 49 | 238990 | All Other Specialty Trade Contractors | 0.8% | 0.9% | 0.9% | 0.9% | 0.9% | 0.8% | 0.8% | 0.8% |
| 50 | 517110 | Wired Telecommunications Carriers | 0.9% | 0.9% | 0.9% | 0.9% | 1.0% | 1.0% | 1.1% | 1.1% |
| 51 | 561990 | All Other Support Services | 0.8% | 0.8% | 0.8% | 0.8% | 0.9% | 0.9% | 0.9% | 0.9% |
| 52 | 423690 | Other Electronic Parts and Equipment Merchant Wholesalers | 0.7% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% |
| 53 | 541513 | Computer Facilities Management Services | 0.7% | 0.7% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% |
| 54 | 541340 | Drafting Services | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% |
| 55 | 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers | 0.6% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.8% |
| 56 | 541820 | Public Relations Agencies | 0.6% | 0.6% | 0.6% | 0.6% | 0.6% | 0.6% | 0.6% | 0.6% |
| 57 | 561110 | Office Administrative Services | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% |
| 58 | 541611 | Administrative Management and General Management Consulting Services | 0.5% | 0.5% | 0.5% | 0.5% | 0.5% | 0.4% | 0.4% | 0.4% |
| 59 | 541990 | All Other Professional, Scientific, and Technical Services | 0.4% | 0.4% | 0.4% | 0.4% | 0.5% | 0.5% | 0.5% | 0.5% |
| 60 | 541310 | Architectural Services | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% |
| 61 | 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers | 0.3% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% | 0.4% |
| 62 | 333319 | Other Commercial and Service Industry Machinery Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 63 | 333999 | All Other Miscellaneous General Purpose Machinery Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 64 | 334411 | Electron Tube Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 65 | 334412 | Bare Printed Circuit Board Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 66 | 334413 | Semiconductor and Related Device Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

Table H-2: U.S. End-Use /ITS Revenue Shares of Total U.S. Output by Industry (ranked on CY 2009)

| Rank | NAICS Code | NAICS Title | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|--------------|------------|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 67 | 334414 | Electronic Capacitor Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 68 | 334415 | Electronic Resistor Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 69 | 334416 | Electronic Coil, Transformer, and Other Inductor Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 70 | 334417 | Electronic Connector Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 71 | 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 72 | 334419 | Other Electronic Component Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 73 | 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 74 | 334514 | Totalizing Fluid Meter and Counting Device Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 75 | 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 76 | 334516 | Analytical Laboratory Instrument Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 77 | 334517 | Irradiation Apparatus Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 78 | 334518 | Watch, Clock, and Part Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 79 | 335311 | Power, Distribution, and Specialty Transformer Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 80 | 335921 | Fiber Optic Cable Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 81 | 335929 | Other Communication and Energy Wire Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 82 | 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 83 | 336321 | Vehicular Lighting Equipment Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 84 | 336322 | Other Motor Vehicle Electrical and Electronic Equipment Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 85 | 336399 | All Other Motor Vehicle Parts Manufacturing | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 86 | 488111 | Air Traffic Control | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Total | | | 1.8% | 1.9% | 1.9% | 1.9% | 1.9% | 1.9% | 1.9% | 2.0% |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|---|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 541512 | Computer Systems Design Services | 20,653 | (36147) | 20,013 | (35027) | 19,876 | (34787) | 20,726 | (36275) | 21,999 | (38501) | 22,934 | (40139) | 23,320 | (40815) | 23,561 | (41237) |
| 336111 | Auto Manufacturing | 16,238 | (16238) | 16,108 | (16108) | 18,460 | (18460) | 19,878 | (19878) | 21,409 | (21409) | 23,019 | (23019) | 24,827 | (24827) | 26,724 | (26724) |
| 541511 | Custom Computer Programming Services | 12,030 | (30901) | 11,621 | (29851) | 11,512 | (29572) | 11,994 | (30809) | 12,771 | (32805) | 13,358 | (34313) | 13,666 | (35103) | 13,893 | (35686) |
| 541330 | Engineering Services | 11,004 | (74576) | 10,894 | (73834) | 11,175 | (75737) | 11,619 | (78741) | 12,046 | (81640) | 12,404 | (84064) | 12,572 | (85200) | 12,703 | (86092) |
| 518210 | Data Processing, Hosting, and Related Services | 9,728 | (22229) | 9,281 | (21210) | 8,787 | (20080) | 8,943 | (20437) | 9,091 | (20776) | 9,291 | (21231) | 9,430 | (21549) | 9,677 | (22113) |
| 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing | 8,645 | (8645) | 8,320 | (8320) | 8,398 | (8398) | 8,268 | (8268) | 8,271 | (8271) | 8,254 | (8254) | 8,507 | (8507) | 8,528 | (8528) |
| 238210 | Electrical Contractors and Other Wiring Installation Contractors | 7,117 | (7117) | 7,017 | (7017) | 6,550 | (6550) | 6,342 | (6342) | 6,396 | (6396) | 6,495 | (6495) | 6,555 | (6555) | 6,662 | (6662) |
| 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing | 6,354 | (21178) | 5,677 | (18922) | 5,898 | (19659) | 5,806 | (19355) | 5,806 | (19352) | 5,806 | (19352) | 5,954 | (19846) | 5,964 | (19882) |
| 541614 | Process, Physical Distribution, and Logistics Consulting Services | 5,944 | (5944) | 5,637 | (5637) | 5,582 | (5582) | 5,714 | (5714) | 5,848 | (5848) | 5,856 | (5856) | 5,842 | (5842) | 5,896 | (5896) |
| 334111 | Electronic Computer Manufacturing | 5,679 | (5679) | 5,259 | (5259) | 5,554 | (5554) | 5,437 | (5437) | 5,363 | (5363) | 5,358 | (5358) | 5,412 | (5412) | 5,480 | (5480) |
| 541690 | Other Scientific and Technical Consulting Services | 4,643 | (7856) | 4,397 | (7441) | 4,352 | (7364) | 4,462 | (7550) | 4,555 | (7708) | 4,578 | (7747) | 4,574 | (7741) | 4,622 | (7821) |
| 237310 | Highway, Street, and Bridge Construction | 4,103 | (4103) | 4,141 | (4141) | 3,861 | (3861) | 3,726 | (3726) | 3,781 | (3781) | 3,879 | (3879) | 3,927 | (3927) | 4,004 | (4004) |
| 334210 | Telephone Apparatus Manufacturing | 3,986 | (3986) | 3,826 | (3826) | 3,847 | (3847) | 3,746 | (3746) | 3,743 | (3743) | 3,728 | (3728) | 3,824 | (3824) | 3,847 | (3847) |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|--|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 541370 | Surveying and Mapping (except Geophysical) Services | 3,773 | (3773) | 3,739 | (3739) | 3,873 | (3873) | 4,055 | (4055) | 4,219 | (4219) | 4,386 | (4386) | 4,456 | (4456) | 4,521 | (4521) |
| 517110 | Wired Telecommunications Carriers | 3,791 | (16676) | 3,611 | (15884) | 3,482 | (15319) | 3,668 | (16134) | 3,858 | (16973) | 4,047 | (17805) | 4,131 | (18175) | 4,239 | (18648) |
| 237130 | Power and Communication Line and Related Structures Construction | 3,410 | (3410) | 3,432 | (3432) | 3,214 | (3214) | 3,100 | (3100) | 3,139 | (3139) | 3,222 | (3222) | 3,283 | (3283) | 3,335 | (3335) |
| 517210 | Wireless Telecommunications Carriers (except Satellite) | 3,414 | (15021) | 3,358 | (14775) | 3,330 | (14648) | 3,597 | (15824) | 3,910 | (17203) | 4,198 | (18466) | 4,393 | (19326) | 4,609 | (20277) |
| 334119 | Other Computer Peripheral Equipment Manufacturing | 3,462 | (3462) | 3,140 | (3140) | 3,205 | (3205) | 3,100 | (3100) | 3,025 | (3025) | 2,970 | (2970) | 3,002 | (3002) | 2,995 | (2995) |
| 334519 | Other Measuring and Controlling Device Manufacturing | 3,196 | (4318) | 2,878 | (3889) | 2,958 | (3998) | 2,898 | (3916) | 2,866 | (3873) | 2,853 | (3856) | 2,905 | (3925) | 2,910 | (3933) |
| 541611 | Administrative Management and General Management Consulting Services | 3,018 | (8501) | 2,851 | (8031) | 2,816 | (7933) | 2,878 | (8107) | 2,929 | (8251) | 2,919 | (8223) | 2,896 | (8159) | 2,926 | (8242) |
| 339950 | Sign Manufacturing | 2,662 | (2662) | 2,557 | (2557) | 2,615 | (2615) | 2,623 | (2623) | 2,665 | (2665) | 2,692 | (2692) | 2,656 | (2656) | 2,644 | (2644) |
| 811219 | Other Electronic and Precision Equipment Repair and Maintenance | 2,643 | (3578) | 2,519 | (3410) | 2,547 | (3448) | 2,589 | (3505) | 2,686 | (3636) | 2,759 | (3736) | 2,780 | (3763) | 2,824 | (3823) |
| 811212 | Computer and Office Machine Repair and Maintenance | 2,624 | (3553) | 2,498 | (3382) | 2,513 | (3402) | 2,549 | (3450) | 2,611 | (3535) | 2,673 | (3618) | 2,700 | (3655) | 2,716 | (3677) |
| 334290 | Other Communications Equipment Manufacturing | 2,596 | (2596) | 2,476 | (2476) | 2,514 | (2514) | 2,490 | (2490) | 2,485 | (2485) | 2,505 | (2505) | 2,549 | (2549) | 2,555 | (2555) |
| 561110 | Office Administrative Services | 2,439 | (6420) | 2,204 | (5802) | 2,204 | (5803) | 2,353 | (6195) | 2,518 | (6629) | 2,621 | (6900) | 2,675 | (7043) | 2,745 | (7227) |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|--|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 541519 | Other Computer Related Services | 2,159 | (5221) | 2,102 | (5083) | 2,084 | (5038) | 2,170 | (5248) | 2,303 | (5568) | 2,399 | (5801) | 2,439 | (5897) | 2,467 | (5965) |
| 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables | 2,310 | (5372) | 2,062 | (4796) | 2,142 | (4982) | 2,122 | (4936) | 2,116 | (4920) | 2,128 | (4950) | 2,164 | (5032) | 2,176 | (5061) |
| 334310 | Audio and Video Equipment Manufacturing | 1,864 | (1864) | 1,791 | (1791) | 1,808 | (1808) | 1,690 | (1690) | 1,612 | (1612) | 1,549 | (1549) | 1,521 | (1521) | 1,484 | (1484) |
| 488210 | Support Activities for Rail Transportation | 1,796 | (1796) | 1,711 | (1711) | 1,652 | (1652) | 1,652 | (1652) | 1,749 | (1749) | 1,842 | (1842) | 1,893 | (1893) | 1,946 | (1946) |
| 515111 | Radio Networks | 1,703 | (1703) | 1,544 | (1544) | 1,488 | (1488) | 1,532 | (1532) | 1,571 | (1571) | 1,627 | (1627) | 1,627 | (1627) | 1,659 | (1659) |
| 561990 | All Other Support Services | 1,607 | (4345) | 1,403 | (3794) | 1,414 | (3823) | 1,495 | (4043) | 1,602 | (4332) | 1,674 | (4526) | 1,707 | (4615) | 1,748 | (4726) |
| 238990 | All Other Specialty Trade Contractors | 1,342 | (1342) | 1,354 | (1354) | 1,278 | (1278) | 1,230 | (1230) | 1,228 | (1228) | 1,241 | (1241) | 1,257 | (1257) | 1,281 | (1281) |
| 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing | 1,505 | (1505) | 1,335 | (1335) | 1,291 | (1291) | 1,245 | (1245) | 1,291 | (1291) | 1,340 | (1340) | 1,371 | (1371) | 1,388 | (1388) |
| 334112 | Computer Storage Device Manufacturing | 1,332 | (1332) | 1,252 | (1252) | 1,293 | (1293) | 1,272 | (1272) | 1,244 | (1244) | 1,234 | (1234) | 1,249 | (1249) | 1,253 | (1253) |
| 811213 | Communication Equipment Repair and Maintenance | 1,257 | (1702) | 1,201 | (1626) | 1,212 | (1641) | 1,220 | (1652) | 1,263 | (1710) | 1,301 | (1761) | 1,320 | (1787) | 1,342 | (1817) |
| 541618 | Other Management Consulting Services | 1,257 | (3541) | 1,183 | (3332) | 1,170 | (3296) | 1,202 | (3386) | 1,223 | (3444) | 1,220 | (3436) | 1,210 | (3407) | 1,216 | (3425) |
| 541513 | Computer Facilities Management Services | 1,190 | (2878) | 1,140 | (2756) | 1,114 | (2693) | 1,151 | (2784) | 1,214 | (2936) | 1,263 | (3054) | 1,272 | (3076) | 1,283 | (3102) |
| 335314 | Relay and Industrial Control Manufacturing | 1,063 | (5317) | 1,114 | (5570) | 1,112 | (5558) | 1,113 | (5566) | 1,153 | (5765) | 1,185 | (5924) | 1,200 | (5998) | 1,189 | (5945) |
| 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers | 1,135 | (4998) | 1,095 | (4823) | 1,081 | (4763) | 1,084 | (4776) | 1,111 | (4891) | 1,131 | (4981) | 1,138 | (5014) | 1,143 | (5032) |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|---|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 336340 | Motor Vehicle Brake System Manufacturing | 1,211 | (1211) | 1,074 | (1074) | 1,019 | (1019) | 992 | (992) | 1,010 | (1010) | 1,055 | (1055) | 1,083 | (1083) | 1,084 | (1084) |
| 541310 | Architectural Services | 1,064 | (7210) | 1,062 | (7199) | 1,095 | (7424) | 1,150 | (7792) | 1,198 | (8119) | 1,235 | (8368) | 1,253 | (8493) | 1,270 | (8606) |
| 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers | 1,057 | (4657) | 1,021 | (4499) | 1,006 | (4429) | 1,004 | (4423) | 1,039 | (4576) | 1,059 | (4663) | 1,064 | (4685) | 1,073 | (4724) |
| 517919 | All Other Telecommunications | 945 | (4158) | 932 | (4098) | 919 | (4042) | 973 | (4282) | 1,037 | (4561) | 1,099 | (4837) | 1,138 | (5007) | 1,187 | (5222) |
| 334113 | Computer Terminal Manufacturing | 806 | (806) | 790 | (790) | 830 | (830) | 811 | (811) | 802 | (802) | 801 | (801) | 835 | (835) | 849 | (849) |
| 488490 | Other Support Activities for Road Transportation | 798 | (798) | 767 | (767) | 742 | (742) | 755 | (755) | 815 | (815) | 865 | (865) | 885 | (885) | 905 | (905) |
| 423690 | Other Electronic Parts and Equipment Merchant Wholesalers | 789 | (3474) | 762 | (3354) | 749 | (3300) | 749 | (3299) | 771 | (3396) | 781 | (3441) | 780 | (3437) | 787 | (3466) |
| 335122 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing | 726 | (726) | 671 | (671) | 650 | (650) | 648 | (648) | 664 | (664) | 647 | (647) | 640 | (640) | 637 | (637) |
| 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing | 723 | (723) | 641 | (641) | 615 | (615) | 589 | (589) | 598 | (598) | 631 | (631) | 646 | (646) | 642 | (642) |
| 561499 | All Other Business Support Services | 585 | (2748) | 539 | (2528) | 540 | (2535) | 580 | (2720) | 620 | (2909) | 647 | (3036) | 665 | (3124) | 692 | (3246) |
| 541990 | All Other Professional, Scientific, and Technical Services | 540 | (2894) | 521 | (2791) | 515 | (2757) | 534 | (2860) | 566 | (3031) | 595 | (3184) | 605 | (3239) | 616 | (3299) |
| 517911 | Telecommunications Resellers | 463 | (2036) | 457 | (2008) | 444 | (1953) | 471 | (2073) | 505 | (2220) | 540 | (2377) | 560 | (2465) | 585 | (2572) |
| 541820 | Public Relations Agencies | 448 | (2581) | 455 | (2619) | 458 | (2638) | 475 | (2735) | 498 | (2867) | 512 | (2951) | 514 | (2960) | 515 | (2967) |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|---|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers | 422 | (1859) | 406 | (1789) | 400 | (1762) | 402 | (1773) | 415 | (1827) | 421 | (1856) | 423 | (1862) | 427 | (1882) |
| 333314 | Optical Instrument and Lens Manufacturing | 395 | (564) | 346 | (495) | 298 | (426) | 306 | (437) | 328 | (468) | 347 | (496) | 343 | (491) | 338 | (483) |
| 333315 | Photographic and Photocopying Equipment Manufacturing | 358 | (358) | 286 | (286) | 262 | (262) | 256 | (256) | 280 | (280) | 315 | (315) | 320 | (320) | 318 | (318) |
| 517410 | Satellite Telecommunications | 219 | (962) | 215 | (945) | 210 | (924) | 218 | (960) | 234 | (1030) | 248 | (1092) | 257 | (1130) | 269 | (1182) |
| 423620 | Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers | 214 | (943) | 208 | (914) | 205 | (903) | 205 | (901) | 211 | (928) | 212 | (934) | 214 | (942) | 215 | (948) |
| 488330 | Navigational Services to Shipping | 219 | (219) | 207 | (207) | 202 | (202) | 202 | (202) | 213 | (213) | 223 | (223) | 228 | (228) | 232 | (232) |
| 488999 | All Other Support Activities for Transportation | 192 | (192) | 194 | (194) | 192 | (192) | 200 | (200) | 212 | (212) | 232 | (232) | 238 | (238) | 246 | (246) |
| 541340 | Drafting Services | 161 | (1092) | 160 | (1085) | 167 | (1132) | 177 | (1196) | 185 | (1253) | 192 | (1301) | 196 | (1327) | 200 | (1352) |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 119 | (522) | 117 | (513) | 115 | (505) | 117 | (517) | 122 | (537) | 125 | (551) | 126 | (554) | 127 | (561) |
| 333319 | Other Commercial and Service Industry Machinery Manufacturing | 0 | (329) | 0 | (301) | 0 | (260) | 0 | (258) | 0 | (272) | 0 | (281) | 0 | (291) | 0 | (292) |
| 333999 | All Other Miscellaneous General Purpose Machinery Manufacturing | 0 | (1432) | 0 | (1411) | 0 | (1290) | 0 | (1283) | 0 | (1350) | 0 | (1412) | 0 | (1402) | 0 | (1398) |
| 334411 | Electron Tube Manufacturing | 0 | (573) | 0 | (575) | 0 | (576) | 0 | (555) | 0 | (529) | 0 | (513) | 0 | (521) | 0 | (519) |
| 334412 | Bare Printed Circuit Board Manufacturing | 0 | (2835) | 0 | (2727) | 0 | (2767) | 0 | (2696) | 0 | (2535) | 0 | (2479) | 0 | (2495) | 0 | (2477) |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|--|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 334413 | Semiconductor and Related Device Manufacturing | 0 | (7589) | 0 | (7428) | 0 | (7251) | 0 | (7036) | 0 | (6661) | 0 | (6486) | 0 | (6525) | 0 | (6441) |
| 334414 | Electronic Capacitor Manufacturing | 0 | (735) | 0 | (715) | 0 | (734) | 0 | (723) | 0 | (677) | 0 | (660) | 0 | (675) | 0 | (666) |
| 334415 | Electronic Resistor Manufacturing | 0 | (597) | 0 | (571) | 0 | (589) | 0 | (569) | 0 | (537) | 0 | (523) | 0 | (530) | 0 | (528) |
| 334416 | Electronic Coil, Transformer, and Other Inductor Manufacturing | 0 | (1261) | 0 | (1204) | 0 | (1211) | 0 | (1178) | 0 | (1099) | 0 | (1084) | 0 | (1099) | 0 | (1086) |
| 334417 | Electronic Connector Manufacturing | 0 | (3364) | 0 | (3240) | 0 | (3272) | 0 | (3178) | 0 | (2968) | 0 | (2903) | 0 | (2925) | 0 | (2891) |
| 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing | 0 | (7035) | 0 | (6615) | 0 | (6743) | 0 | (6629) | 0 | (6274) | 0 | (6123) | 0 | (6200) | 0 | (6123) |
| 334419 | Other Electronic Component Manufacturing | 0 | (7822) | 0 | (7559) | 0 | (7634) | 0 | (7433) | 0 | (7063) | 0 | (6921) | 0 | (7006) | 0 | (6933) |
| 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use | 0 | (1591) | 0 | (1439) | 0 | (1474) | 0 | (1461) | 0 | (1456) | 0 | (1467) | 0 | (1497) | 0 | (1507) |
| 334514 | Totalizing Fluid Meter and Counting Device Manufacturing | 0 | (1242) | 0 | (1106) | 0 | (1139) | 0 | (1144) | 0 | (1145) | 0 | (1153) | 0 | (1184) | 0 | (1185) |
| 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals | 0 | (4224) | 0 | (3685) | 0 | (3806) | 0 | (3761) | 0 | (3759) | 0 | (3780) | 0 | (3853) | 0 | (3869) |
| 334516 | Analytical Laboratory Instrument Manufacturing | 0 | (1841) | 0 | (1632) | 0 | (1686) | 0 | (1641) | 0 | (1628) | 0 | (1620) | 0 | (1657) | 0 | (1659) |
| 334517 | Irradiation Apparatus Manufacturing | 0 | (1425) | 0 | (1267) | 0 | (1312) | 0 | (1290) | 0 | (1275) | 0 | (1254) | 0 | (1272) | 0 | (1257) |

Table H-3: U.S. ITS Employment by NAICs industry (ranked on 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|--------------|--|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 334518 | Watch, Clock, and Part Manufacturing | 0 | (221) | 0 | (200) | 0 | (205) | 0 | (206) | 0 | (202) | 0 | (205) | 0 | (208) | 0 | (208) |
| 335311 | Power, Distribution, and Specialty Transformer Manufacturing | 0 | (1252) | 0 | (1326) | 0 | (1326) | 0 | (1334) | 0 | (1377) | 0 | (1424) | 0 | (1427) | 0 | (1422) |
| 335921 | Fiber Optic Cable Manufacturing | 0 | (360) | 0 | (377) | 0 | (366) | 0 | (366) | 0 | (369) | 0 | (374) | 0 | (370) | 0 | (368) |
| 335929 | Other Communication and Energy Wire Manufacturing | 0 | (2388) | 0 | (2594) | 0 | (2511) | 0 | (2521) | 0 | (2535) | 0 | (2554) | 0 | (2535) | 0 | (2502) |
| 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing | 0 | (2550) | 0 | (2560) | 0 | (2530) | 0 | (2550) | 0 | (2606) | 0 | (2652) | 0 | (2658) | 0 | (2632) |
| 336321 | Vehicular Lighting Equipment Manufacturing | 0 | (623) | 0 | (545) | 0 | (528) | 0 | (511) | 0 | (522) | 0 | (539) | 0 | (548) | 0 | (547) |
| 336322 | Other Motor Vehicle Electrical and Electronic Equipment Manufacturing | 0 | (2093) | 0 | (1837) | 0 | (1741) | 0 | (1664) | 0 | (1721) | 0 | (1780) | 0 | (1831) | 0 | (1826) |
| 336399 | All Other Motor Vehicle Parts Manufacturing | 0 | (7984) | 0 | (7054) | 0 | (6711) | 0 | (6393) | 0 | (6560) | 0 | (6793) | 0 | (6909) | 0 | (6905) |
| 488111 | Air Traffic Control | 0 | (138) | 0 | (129) | 0 | (131) | 0 | (141) | 0 | (157) | 0 | (171) | 0 | (182) | 0 | (191) |
| Total | | 187,123 | (463716) | 179,571 | (445442) | 180,895 | (447061) | 184,553 | (456726) | 190,990 | (471079) | 196,722 | (484087) | 201,216 | (493274) | 205,366 | (500786) |

Table H-4: U.S. ITS Employment Shares of TOTAL U.S. Employment by Industry (ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|--|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 334290 | Other Communications Equipment Manufacturing | 12.70% | (12.7%) | 13.00% | (13%) | 12.70% | (12.7%) | 12.90% | (12.9%) | 13.40% | (13.4%) | 13.70% | (13.7%) | 13.70% | (13.7%) | 13.80% | (13.8%) |
| 334111 | Electronic Computer Manufacturing | 12.70% | (12.7%) | 12.90% | (12.9%) | 13.20% | (13.2%) | 13.10% | (13.1%) | 13.10% | (13.1%) | 13.30% | (13.3%) | 13.10% | (13.1%) | 13.20% | (13.2%) |
| 515111 | Radio Networks | 12.40% | (12.4%) | 11.90% | (11.9%) | 11.90% | (11.9%) | 11.80% | (11.8%) | 11.90% | (11.9%) | 12.00% | (12%) | 11.80% | (11.8%) | 11.70% | (11.7%) |
| 334310 | Audio and Video Equipment Manufacturing | 8.50% | (8.5%) | 9.00% | (9%) | 8.90% | (8.9%) | 8.60% | (8.6%) | 8.50% | (8.5%) | 8.30% | (8.3%) | 8.10% | (8.1%) | 7.90% | (7.9%) |
| 541614 | Process, Physical Distribution, and Logistics Consulting Services | 8.90% | (8.9%) | 8.70% | (8.7%) | 8.60% | (8.6%) | 8.60% | (8.6%) | 8.50% | (8.5%) | 8.40% | (8.4%) | 8.30% | (8.3%) | 8.30% | (8.3%) |
| 334519 | Other Measuring and Controlling Device Manufacturing | 8.88% | (12%) | 8.51% | (11.5%) | 8.44% | (11.4%) | 8.29% | (11.2%) | 8.44% | (11.4%) | 8.44% | (11.4%) | 8.29% | (11.2%) | 8.29% | (11.2%) |
| 811213 | Communication Equipment Repair and Maintenance | 8.20% | (11.1%) | 8.05% | (10.9%) | 8.20% | (11.1%) | 8.35% | (11.3%) | 8.64% | (11.7%) | 8.86% | (12%) | 8.94% | (12.1%) | 9.01% | (12.2%) |
| 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing | 7.70% | (7.7%) | 8.00% | (8%) | 7.80% | (7.8%) | 7.60% | (7.6%) | 7.80% | (7.8%) | 7.80% | (7.8%) | 7.90% | (7.9%) | 7.80% | (7.8%) |
| 334210 | Telephone Apparatus Manufacturing | 7.10% | (7.1%) | 7.50% | (7.5%) | 7.10% | (7.1%) | 6.90% | (6.9%) | 7.10% | (7.1%) | 7.20% | (7.2%) | 7.20% | (7.2%) | 7.20% | (7.2%) |
| 334119 | Other Computer Peripheral Equipment Manufacturing | 6.90% | (6.9%) | 7.10% | (7.1%) | 7.10% | (7.1%) | 7.10% | (7.1%) | 7.30% | (7.3%) | 7.40% | (7.4%) | 7.50% | (7.5%) | 7.60% | (7.6%) |
| 334112 | Computer Storage Device Manufacturing | 5.80% | (5.8%) | 6.40% | (6.4%) | 6.50% | (6.5%) | 6.40% | (6.4%) | 6.50% | (6.5%) | 6.60% | (6.6%) | 6.60% | (6.6%) | 6.70% | (6.7%) |
| 488210 | Support Activities for Rail Transportation | 6.40% | (6.4%) | 6.40% | (6.4%) | 6.40% | (6.4%) | 6.30% | (6.3%) | 6.40% | (6.4%) | 6.50% | (6.5%) | 6.50% | (6.5%) | 6.50% | (6.5%) |
| 336399 | All Other Motor Vehicle Parts Manufacturing | 5.70% | (5.7%) | 6.30% | (6.3%) | 6.30% | (6.3%) | 5.70% | (5.7%) | 5.40% | (5.4%) | 5.20% | (5.2%) | 5.20% | (5.2%) | 5.30% | (5.3%) |
| 541370 | Surveying and Mapping (except Geophysical) Services | 5.70% | (5.7%) | 5.90% | (5.9%) | 6.10% | (6.1%) | 6.10% | (6.1%) | 6.20% | (6.2%) | 6.20% | (6.2%) | 6.20% | (6.2%) | 6.30% | (6.3%) |
| 811219 | Other Electronic and Precision Equipment Repair and Maintenance | 5.98% | (8.1%) | 5.83% | (7.9%) | 5.76% | (7.8%) | 5.76% | (7.8%) | 5.84% | (7.9%) | 5.91% | (8%) | 5.76% | (7.8%) | 5.76% | (7.8%) |
| 336321 | Vehicular Lighting Equipment Manufacturing | 4.90% | (4.9%) | 5.40% | (5.4%) | 5.40% | (5.4%) | 5.00% | (5%) | 4.60% | (4.6%) | 4.50% | (4.5%) | 4.50% | (4.5%) | 4.60% | (4.6%) |
| 811212 | Computer and Office Machine Repair and Maintenance | 5.02% | (6.8%) | 4.95% | (6.7%) | 5.02% | (6.8%) | 5.10% | (6.9%) | 5.24% | (7.1%) | 5.39% | (7.3%) | 5.39% | (7.3%) | 5.39% | (7.3%) |
| 336340 | Motor Vehicle Brake System Manufacturing | 4.20% | (4.2%) | 4.80% | (4.8%) | 4.90% | (4.9%) | 4.70% | (4.7%) | 4.50% | (4.5%) | 4.50% | (4.5%) | 4.60% | (4.6%) | 4.80% | (4.8%) |
| 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables | 4.86% | (11.3%) | 4.64% | (10.8%) | 4.60% | (10.7%) | 4.56% | (10.6%) | 4.69% | (10.9%) | 4.73% | (11%) | 4.64% | (10.8%) | 4.64% | (10.8%) |
| 333315 | Photographic and Photocopying Equipment Manufacturing | 4.79% | (4.8%) | 4.30% | (4.3%) | 4.40% | (4.4%) | 4.20% | (4.2%) | 4.30% | (4.3%) | 4.60% | (4.6%) | 4.70% | (4.7%) | 4.79% | (4.8%) |
| 541618 | Other Management Consulting Services | 4.51% | (12.7%) | 4.30% | (12.1%) | 4.26% | (12%) | 4.26% | (12%) | 4.19% | (11.8%) | 4.08% | (11.5%) | 3.98% | (11.2%) | 3.94% | (11.1%) |
| 541690 | Other Scientific and Technical Consulting Services | 4.14% | (7%) | 4.02% | (6.8%) | 4.02% | (6.8%) | 3.96% | (6.7%) | 3.84% | (6.5%) | 3.78% | (6.4%) | 3.72% | (6.3%) | 3.72% | (6.3%) |

Table H-4: U.S. ITS Employment Shares of TOTAL U.S. Employment by Industry (ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|---|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 541512 | Computer Systems Design Services | 4.06% | (7.1%) | 4.00% | (7%) | 4.00% | (7%) | 3.94% | (6.9%) | 4.06% | (7.1%) | 4.11% | (7.2%) | 4.11% | (7.2%) | 4.11% | (7.2%) |
| 335122 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing | 3.80% | (3.8%) | 3.90% | (3.9%) | 3.90% | (3.9%) | 3.80% | (3.8%) | 3.90% | (3.9%) | 3.70% | (3.7%) | 3.80% | (3.8%) | 3.90% | (3.9%) |
| 334113 | Computer Terminal Manufacturing | 3.40% | (3.4%) | 3.70% | (3.7%) | 3.70% | (3.7%) | 3.90% | (3.9%) | 4.00% | (4%) | 4.10% | (4.1%) | 4.20% | (4.2%) | 4.30% | (4.3%) |
| 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing | 3.99% | (13.3%) | 3.69% | (12.3%) | 3.60% | (12%) | 3.54% | (11.8%) | 3.57% | (11.9%) | 3.57% | (11.9%) | 3.51% | (11.7%) | 3.48% | (11.6%) |
| 488490 | Other Support Activities for Road Transportation | 3.50% | (3.5%) | 3.60% | (3.6%) | 3.50% | (3.5%) | 3.50% | (3.5%) | 3.60% | (3.6%) | 3.60% | (3.6%) | 3.50% | (3.5%) | 3.50% | (3.5%) |
| 339950 | Sign Manufacturing | 3.10% | (3.1%) | 3.20% | (3.2%) | 3.10% | (3.1%) | 3.00% | (3%) | 3.00% | (3%) | 3.00% | (3%) | 3.00% | (3%) | 2.90% | (2.9%) |
| 518210 | Data Processing, Hosting, and Related Services | 3.11% | (7.1%) | 3.15% | (7.2%) | 3.11% | (7.1%) | 3.06% | (7%) | 3.11% | (7.1%) | 3.15% | (7.2%) | 3.19% | (7.3%) | 3.24% | (7.4%) |
| 335314 | Relay and Industrial Control Manufacturing | 2.58% | (12.9%) | 2.98% | (14.9%) | 3.04% | (15.2%) | 3.00% | (15%) | 3.06% | (15.3%) | 3.14% | (15.7%) | 3.24% | (16.2%) | 3.28% | (16.4%) |
| 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing | 2.00% | (2%) | 2.30% | (2.3%) | 2.40% | (2.4%) | 2.30% | (2.3%) | 2.20% | (2.2%) | 2.20% | (2.2%) | 2.20% | (2.2%) | 2.30% | (2.3%) |
| 541511 | Custom Computer Programming Services | 2.34% | (6%) | 2.30% | (5.9%) | 2.22% | (5.7%) | 2.18% | (5.6%) | 2.18% | (5.6%) | 2.22% | (5.7%) | 2.18% | (5.6%) | 2.18% | (5.6%) |
| 237130 | Power and Communication Line and Related Structures Construction | 1.90% | (1.9%) | 2.20% | (2.2%) | 2.20% | (2.2%) | 2.10% | (2.1%) | 2.00% | (2%) | 1.90% | (1.9%) | 1.80% | (1.8%) | 1.80% | (1.8%) |
| 333314 | Optical Instrument and Lens Manufacturing | 2.10% | (3%) | 2.10% | (3%) | 1.96% | (2.8%) | 1.96% | (2.8%) | 1.89% | (2.7%) | 1.89% | (2.7%) | 1.89% | (2.7%) | 1.89% | (2.7%) |
| 488999 | All Other Support Activities for Transportation | 1.70% | (1.7%) | 1.90% | (1.9%) | 1.90% | (1.9%) | 2.00% | (2%) | 2.00% | (2%) | 2.10% | (2.1%) | 2.10% | (2.1%) | 2.10% | (2.1%) |
| 541519 | Other Computer Related Services | 1.86% | (4.5%) | 1.86% | (4.5%) | 1.82% | (4.4%) | 1.82% | (4.4%) | 1.82% | (4.4%) | 1.86% | (4.5%) | 1.86% | (4.5%) | 1.86% | (4.5%) |
| 517919 | All Other Telecommunications | 1.86% | (8.2%) | 1.84% | (8.1%) | 1.89% | (8.3%) | 1.96% | (8.6%) | 2.07% | (9.1%) | 2.14% | (9.4%) | 2.18% | (9.6%) | 2.23% | (9.8%) |
| 517410 | Satellite Telecommunications | 1.80% | (7.9%) | 1.77% | (7.8%) | 1.82% | (8%) | 1.84% | (8.1%) | 1.93% | (8.5%) | 2.00% | (8.8%) | 2.00% | (8.8%) | 2.05% | (9%) |
| 237310 | Highway, Street, and Bridge Construction | 1.30% | (1.3%) | 1.50% | (1.5%) | 1.50% | (1.5%) | 1.50% | (1.5%) | 1.40% | (1.4%) | 1.30% | (1.3%) | 1.30% | (1.3%) | 1.30% | (1.3%) |
| 488330 | Navigational Services to Shipping | 1.50% | (1.5%) | 1.50% | (1.5%) | 1.40% | (1.4%) | 1.40% | (1.4%) | 1.40% | (1.4%) | 1.40% | (1.4%) | 1.40% | (1.4%) | 1.40% | (1.4%) |
| 517911 | Telecommunications Resellers | 1.48% | (6.5%) | 1.43% | (6.3%) | 1.45% | (6.4%) | 1.48% | (6.5%) | 1.55% | (6.8%) | 1.59% | (7%) | 1.59% | (7%) | 1.61% | (7.1%) |
| 517210 | Wireless Telecommunications Carriers (except Satellite) | 1.43% | (6.3%) | 1.41% | (6.2%) | 1.43% | (6.3%) | 1.43% | (6.3%) | 1.50% | (6.6%) | 1.55% | (6.8%) | 1.55% | (6.8%) | 1.57% | (6.9%) |
| 561499 | All Other Business Support Services | 1.36% | (6.4%) | 1.38% | (6.5%) | 1.32% | (6.2%) | 1.30% | (6.1%) | 1.32% | (6.2%) | 1.30% | (6.1%) | 1.28% | (6%) | 1.28% | (6%) |
| 541513 | Computer Facilities Management Services | 1.28% | (3.1%) | 1.28% | (3.1%) | 1.32% | (3.2%) | 1.32% | (3.2%) | 1.36% | (3.3%) | 1.41% | (3.4%) | 1.41% | (3.4%) | 1.41% | (3.4%) |
| 541330 | Engineering Services | 1.18% | (8%) | 1.21% | (8.2%) | 1.24% | (8.4%) | 1.22% | (8.3%) | 1.21% | (8.2%) | 1.22% | (8.3%) | 1.21% | (8.2%) | 1.21% | (8.2%) |
| 541820 | Public Relations Agencies | 1.02% | (5.9%) | 1.06% | (6.1%) | 1.08% | (6.2%) | 1.06% | (6.1%) | 1.08% | (6.2%) | 1.09% | (6.3%) | 1.08% | (6.2%) | 1.08% | (6.2%) |

Table H-4: U.S. ITS Employment Shares of TOTAL U.S. Employment by Industry (ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------------|---|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 238210 | Electrical Contractors and Other Wiring Installation Contractors | 0.90% | (0.9%) | 1.00% | (1%) | 1.00% | (1%) | 1.00% | (1%) | 0.90% | (0.9%) | 0.90% | (0.9%) | 0.90% | (0.9%) | 0.90% | (0.9%) |
| 561990 | All Other Support Services | 1.00% | (2.7%) | 1.00% | (2.7%) | 1.00% | (2.7%) | 1.00% | (2.7%) | 1.00% | (2.7%) | 1.04% | (2.8%) | 1.04% | (2.8%) | 1.04% | (2.8%) |
| 541340 | Drafting Services | 0.84% | (5.7%) | 0.84% | (5.7%) | 0.87% | (5.9%) | 0.87% | (5.9%) | 0.89% | (6%) | 0.89% | (6%) | 0.89% | (6%) | 0.87% | (5.9%) |
| 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers | 0.70% | (3.1%) | 0.73% | (3.2%) | 0.73% | (3.2%) | 0.73% | (3.2%) | 0.73% | (3.2%) | 0.75% | (3.3%) | 0.73% | (3.2%) | 0.75% | (3.3%) |
| 541611 | Administrative Management and General Management Consulting Services | 0.71% | (2%) | 0.71% | (2%) | 0.71% | (2%) | 0.67% | (1.9%) | 0.67% | (1.9%) | 0.64% | (1.8%) | 0.64% | (1.8%) | 0.64% | (1.8%) |
| 238990 | All Other Specialty Trade Contractors | 0.60% | (0.6%) | 0.70% | (0.7%) | 0.70% | (0.7%) | 0.70% | (0.7%) | 0.60% | (0.6%) | 0.60% | (0.6%) | 0.60% | (0.6%) | 0.60% | (0.6%) |
| 541990 | All Other Professional, Scientific, and Technical Services | 0.62% | (3.3%) | 0.62% | (3.3%) | 0.62% | (3.3%) | 0.63% | (3.4%) | 0.65% | (3.5%) | 0.69% | (3.7%) | 0.69% | (3.7%) | 0.71% | (3.8%) |
| 561110 | Office Administrative Services | 0.61% | (1.6%) | 0.61% | (1.6%) | 0.61% | (1.6%) | 0.61% | (1.6%) | 0.61% | (1.6%) | 0.61% | (1.6%) | 0.61% | (1.6%) | 0.57% | (1.5%) |
| 423620 | Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers | 0.54% | (2.4%) | 0.57% | (2.5%) | 0.59% | (2.6%) | 0.59% | (2.6%) | 0.61% | (2.7%) | 0.61% | (2.7%) | 0.61% | (2.7%) | 0.61% | (2.7%) |
| 517110 | Wired Telecommunications Carriers | 0.55% | (2.4%) | 0.55% | (2.4%) | 0.57% | (2.5%) | 0.57% | (2.5%) | 0.59% | (2.6%) | 0.61% | (2.7%) | 0.64% | (2.8%) | 0.66% | (2.9%) |
| 541310 | Architectural Services | 0.55% | (3.7%) | 0.55% | (3.7%) | 0.56% | (3.8%) | 0.56% | (3.8%) | 0.56% | (3.8%) | 0.56% | (3.8%) | 0.56% | (3.8%) | 0.56% | (3.8%) |
| 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers | 0.48% | (2.1%) | 0.50% | (2.2%) | 0.50% | (2.2%) | 0.50% | (2.2%) | 0.52% | (2.3%) | 0.52% | (2.3%) | 0.52% | (2.3%) | 0.54% | (2.4%) |
| 423690 | Other Electronic Parts and Equipment Merchant Wholesalers | 0.36% | (1.6%) | 0.39% | (1.7%) | 0.39% | (1.7%) | 0.39% | (1.7%) | 0.41% | (1.8%) | 0.41% | (1.8%) | 0.41% | (1.8%) | 0.41% | (1.8%) |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 0.30% | (1.3%) | 0.32% | (1.4%) | 0.32% | (1.4%) | 0.32% | (1.4%) | 0.32% | (1.4%) | 0.32% | (1.4%) | 0.32% | (1.4%) | 0.32% | (1.4%) |
| 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers | 0.25% | (1.1%) | 0.25% | (1.1%) | 0.25% | (1.1%) | 0.25% | (1.1%) | 0.25% | (1.1%) | 0.25% | (1.1%) | 0.25% | (1.1%) | 0.25% | (1.1%) |
| 333319 | Other Commercial and Service Industry Machinery Manufacturing | 0.00% | (0.6%) | 0.00% | (0.6%) | 0.00% | (0.6%) | 0.00% | (0.6%) | 0.00% | (0.6%) | 0.00% | (0.5%) | 0.00% | (0.6%) | 0.00% | (0.6%) |
| 333999 | All Other Miscellaneous General Purpose Machinery Manufacturing | 0.00% | (2.8%) | 0.00% | (3.2%) | 0.00% | (3.2%) | 0.00% | (3.1%) | 0.00% | (3%) | 0.00% | (3%) | 0.00% | (3%) | 0.00% | (3.1%) |
| 334411 | Electron Tube Manufacturing | 0.00% | (8.6%) | 0.00% | (9%) | 0.00% | (8.8%) | 0.00% | (8.7%) | 0.00% | (8.5%) | 0.00% | (8.3%) | 0.00% | (8.2%) | 0.00% | (8.1%) |
| 334412 | Bare Printed Circuit Board Manufacturing | 0.00% | (6%) | 0.00% | (6.3%) | 0.00% | (6%) | 0.00% | (5.8%) | 0.00% | (5.6%) | 0.00% | (5.5%) | 0.00% | (5.4%) | 0.00% | (5.3%) |
| 334413 | Semiconductor and Related Device Manufacturing | 0.00% | (4.5%) | 0.00% | (4.8%) | 0.00% | (4.6%) | 0.00% | (4.5%) | 0.00% | (4.4%) | 0.00% | (4.4%) | 0.00% | (4.4%) | 0.00% | (4.4%) |
| 334414 | Electronic Capacitor Manufacturing | 0.00% | (9.1%) | 0.00% | (9.5%) | 0.00% | (9.3%) | 0.00% | (9.2%) | 0.00% | (8.9%) | 0.00% | (8.8%) | 0.00% | (8.8%) | 0.00% | (8.7%) |

Table H-4: U.S. ITS Employment Shares of TOTAL U.S. Employment by Industry (ranked on CY 2009 end-use ITS)

| NAICS Code | NAICS Title | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|--------------|--|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 334415 | Electronic Resistor Manufacturing | 0.00% | (11.3%) | 0.00% | (12%) | 0.00% | (11.9%) | 0.00% | (11.6%) | 0.00% | (11.3%) | 0.00% | (11.2%) | 0.00% | (11.1%) | 0.00% | (11.1%) |
| 334416 | Electronic Coil, Transformer, and Other Inductor Manufacturing | 0.00% | (10.5%) | 0.00% | (11%) | 0.00% | (10.7%) | 0.00% | (10.5%) | 0.00% | (10.1%) | 0.00% | (10.1%) | 0.00% | (10.1%) | 0.00% | (10%) |
| 334417 | Electronic Connector Manufacturing | 0.00% | (11.1%) | 0.00% | (12%) | 0.00% | (11.5%) | 0.00% | (11.2%) | 0.00% | (10.7%) | 0.00% | (10.5%) | 0.00% | (10.4%) | 0.00% | (10.3%) |
| 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing | 0.00% | (8.7%) | 0.00% | (8.9%) | 0.00% | (8.7%) | 0.00% | (8.6%) | 0.00% | (8.4%) | 0.00% | (8.3%) | 0.00% | (8.2%) | 0.00% | (8%) |
| 334419 | Other Electronic Component Manufacturing | 0.00% | (11.1%) | 0.00% | (11.6%) | 0.00% | (11.2%) | 0.00% | (11%) | 0.00% | (10.8%) | 0.00% | (10.7%) | 0.00% | (10.6%) | 0.00% | (10.4%) |
| 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use | 0.00% | (10.5%) | 0.00% | (10.2%) | 0.00% | (10.2%) | 0.00% | (10.3%) | 0.00% | (10.6%) | 0.00% | (10.7%) | 0.00% | (10.7%) | 0.00% | (10.7%) |
| 334514 | Totalizing Fluid Meter and Counting Device Manufacturing | 0.00% | (7.1%) | 0.00% | (7%) | 0.00% | (7%) | 0.00% | (7.1%) | 0.00% | (7.3%) | 0.00% | (7.3%) | 0.00% | (7.3%) | 0.00% | (7.2%) |
| 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals | 0.00% | (8.3%) | 0.00% | (7.8%) | 0.00% | (7.8%) | 0.00% | (7.9%) | 0.00% | (8.2%) | 0.00% | (8.3%) | 0.00% | (8.4%) | 0.00% | (8.4%) |
| 334516 | Analytical Laboratory Instrument Manufacturing | 0.00% | (4.8%) | 0.00% | (4.5%) | 0.00% | (4.4%) | 0.00% | (4.4%) | 0.00% | (4.5%) | 0.00% | (4.5%) | 0.00% | (4.5%) | 0.00% | (4.5%) |
| 334517 | Irradiation Apparatus Manufacturing | 0.00% | (7.3%) | 0.00% | (7.1%) | 0.00% | (7%) | 0.00% | (7%) | 0.00% | (7.2%) | 0.00% | (7.2%) | 0.00% | (7.2%) | 0.00% | (7.1%) |
| 334518 | Watch, Clock, and Part Manufacturing | 0.00% | (8.8%) | 0.00% | (8.4%) | 0.00% | (8.3%) | 0.00% | (8.5%) | 0.00% | (8.5%) | 0.00% | (8.6%) | 0.00% | (8.5%) | 0.00% | (8.4%) |
| 335311 | Power, Distribution, and Specialty Transformer Manufacturing | 0.00% | (5.5%) | 0.00% | (6.4%) | 0.00% | (6.4%) | 0.00% | (6.2%) | 0.00% | (6.2%) | 0.00% | (6.3%) | 0.00% | (6.4%) | 0.00% | (6.5%) |
| 335921 | Fiber Optic Cable Manufacturing | 0.00% | (6%) | 0.00% | (6.9%) | 0.00% | (6.9%) | 0.00% | (6.9%) | 0.00% | (6.8%) | 0.00% | (6.8%) | 0.00% | (6.8%) | 0.00% | (7%) |
| 335929 | Other Communication and Energy Wire Manufacturing | 0.00% | (8.3%) | 0.00% | (10%) | 0.00% | (10.1%) | 0.00% | (10%) | 0.00% | (10%) | 0.00% | (10%) | 0.00% | (10.2%) | 0.00% | (10.4%) |
| 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing | 0.00% | (7.6%) | 0.00% | (8.4%) | 0.00% | (8.5%) | 0.00% | (8.3%) | 0.00% | (8.4%) | 0.00% | (8.5%) | 0.00% | (8.6%) | 0.00% | (8.7%) |
| 336322 | Other Motor Vehicle Electrical and Electronic Equipment Manufacturing | 0.00% | (3.9%) | 0.00% | (4.3%) | 0.00% | (4.3%) | 0.00% | (4.1%) | 0.00% | (3.9%) | 0.00% | (3.8%) | 0.00% | (3.9%) | 0.00% | (4%) |
| 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing | 0.00% | (2.2%) | 0.00% | (2.5%) | 0.00% | (2.6%) | 0.00% | (2.4%) | 0.00% | (2.3%) | 0.00% | (2.4%) | 0.00% | (2.4%) | 0.00% | (2.5%) |
| 3361_2 | Auto Manufacturing | 0.00% | (4.8%) | 0.00% | (5.9%) | 0.00% | (7.1%) | 0.00% | (7.4%) | 0.00% | (7.3%) | 0.00% | (7.4%) | 0.00% | (7.8%) | 0.00% | (8.6%) |
| 488111 | Air Traffic Control | 0.00% | (5.9%) | 0.00% | (5.6%) | 0.00% | (5.8%) | 0.00% | (6.1%) | 0.00% | (6.2%) | 0.00% | (6.4%) | 0.00% | (6.6%) | 0.00% | (6.6%) |
| Total | | 1.90% | (4.7%) | 1.94% | (4.8%) | 1.98% | (4.9%) | 1.98% | (4.9%) | 1.99% | (4.9%) | 1.99% | (4.9%) | 2.00% | (4.9%) | 2.01% | (4.9%) |

Table H-5: U.S. ITS Revenue by State(in billions of USD, ranked on CY 2009 end-use ITS)

| Rank | State | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------|----------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 1 | California | 5.85 | (13.43) | 5.59 | (12.88) | 5.83 | (13.5) | 6.25 | (14.48) | 6.71 | (15.61) | 7.07 | (16.5) | 7.39 | (17.29) | 7.73 | (18.11) |
| 2 | Texas | 3.81 | (9.5) | 3.81 | (9.38) | 4.03 | (9.85) | 4.34 | (10.55) | 4.70 | (11.38) | 4.98 | (12.03) | 5.26 | (12.68) | 5.52 | (13.26) |
| 3 | Virginia | 2.46 | (6.01) | 2.41 | (5.81) | 2.55 | (6.09) | 2.71 | (6.47) | 2.95 | (6.98) | 3.13 | (7.38) | 3.31 | (7.76) | 3.47 | (8.1) |
| 4 | Florida | 2.10 | (5.3) | 2.03 | (5.12) | 2.11 | (5.28) | 2.24 | (5.58) | 2.42 | (6.01) | 2.56 | (6.34) | 2.70 | (6.65) | 2.82 | (6.93) |
| 5 | New York | 2.26 | (5.23) | 2.20 | (5.06) | 2.26 | (5.22) | 2.35 | (5.45) | 2.49 | (5.78) | 2.59 | (6.02) | 2.68 | (6.23) | 2.75 | (6.41) |
| 6 | Michigan | 1.87 | (4.48) | 1.80 | (4.3) | 2.01 | (4.61) | 2.19 | (4.99) | 2.38 | (5.41) | 2.53 | (5.73) | 2.71 | (6.06) | 2.92 | (6.41) |
| 7 | Illinois | 1.78 | (4.2) | 1.75 | (4.13) | 1.85 | (4.31) | 2.00 | (4.63) | 2.16 | (5) | 2.29 | (5.28) | 2.40 | (5.51) | 2.51 | (5.73) |
| 8 | Pennsylvania | 1.65 | (4.17) | 1.63 | (4.09) | 1.72 | (4.28) | 1.83 | (4.55) | 1.97 | (4.86) | 2.08 | (5.12) | 2.18 | (5.35) | 2.27 | (5.56) |
| 9 | New Jersey | 1.56 | (3.94) | 1.54 | (3.84) | 1.59 | (3.97) | 1.68 | (4.19) | 1.80 | (4.47) | 1.89 | (4.69) | 1.98 | (4.89) | 2.05 | (5.06) |
| 10 | Ohio | 1.73 | (3.8) | 1.68 | (3.67) | 1.80 | (3.88) | 1.90 | (4.12) | 2.02 | (4.39) | 2.13 | (4.63) | 2.23 | (4.84) | 2.32 | (5.03) |
| 11 | Massachusetts | 1.55 | (3.76) | 1.50 | (3.64) | 1.55 | (3.77) | 1.64 | (3.98) | 1.74 | (4.24) | 1.82 | (4.44) | 1.89 | (4.62) | 1.96 | (4.79) |
| 12 | Georgia | 1.64 | (3.64) | 1.61 | (3.54) | 1.70 | (3.7) | 1.84 | (3.97) | 2.01 | (4.28) | 2.15 | (4.55) | 2.27 | (4.79) | 2.39 | (5.01) |
| 13 | Maryland | 1.43 | (3.53) | 1.39 | (3.43) | 1.44 | (3.54) | 1.51 | (3.7) | 1.59 | (3.9) | 1.67 | (4.06) | 1.73 | (4.22) | 1.79 | (4.35) |
| 14 | North Carolina | 1.46 | (3.12) | 1.43 | (3.01) | 1.51 | (3.12) | 1.65 | (3.36) | 1.84 | (3.67) | 1.99 | (3.9) | 2.10 | (4.09) | 2.18 | (4.24) |
| 15 | Colorado | 1.25 | (2.9) | 1.21 | (2.81) | 1.24 | (2.88) | 1.31 | (3.05) | 1.41 | (3.28) | 1.49 | (3.46) | 1.55 | (3.61) | 1.62 | (3.76) |
| 16 | Missouri | 1.18 | (2.72) | 1.17 | (2.67) | 1.23 | (2.77) | 1.27 | (2.88) | 1.32 | (3.02) | 1.37 | (3.13) | 1.41 | (3.23) | 1.45 | (3.32) |
| 17 | Washington | 0.97 | (2.45) | 0.95 | (2.39) | 0.97 | (2.44) | 1.00 | (2.52) | 1.07 | (2.68) | 1.13 | (2.81) | 1.17 | (2.92) | 1.22 | (3.03) |
| 18 | Indiana | 1.06 | (2.25) | 1.10 | (2.26) | 1.21 | (2.4) | 1.30 | (2.56) | 1.39 | (2.75) | 1.46 | (2.88) | 1.54 | (3.03) | 1.63 | (3.17) |
| 19 | Minnesota | 1.01 | (2.03) | 0.98 | (1.97) | 1.03 | (2.05) | 1.08 | (2.17) | 1.16 | (2.33) | 1.22 | (2.45) | 1.26 | (2.55) | 1.30 | (2.64) |
| 20 | Arizona | 0.78 | (1.96) | 0.75 | (1.89) | 0.78 | (1.97) | 0.83 | (2.08) | 0.89 | (2.23) | 0.93 | (2.34) | 0.97 | (2.43) | 1.01 | (2.53) |
| 21 | Alabama | 0.95 | (1.87) | 0.98 | (1.87) | 1.11 | (2.02) | 1.22 | (2.18) | 1.35 | (2.37) | 1.47 | (2.54) | 1.60 | (2.71) | 1.76 | (2.9) |
| 22 | Connecticut | 0.75 | (1.88) | 0.74 | (1.83) | 0.77 | (1.91) | 0.81 | (2.02) | 0.87 | (2.16) | 0.91 | (2.26) | 0.95 | (2.35) | 0.98 | (2.43) |
| 23 | Tennessee | 0.81 | (1.86) | 0.80 | (1.81) | 0.85 | (1.89) | 0.90 | (2.01) | 0.98 | (2.17) | 1.04 | (2.29) | 1.09 | (2.4) | 1.13 | (2.49) |
| 24 | Kentucky | 0.82 | (1.5) | 0.83 | (1.49) | 0.92 | (1.6) | 0.97 | (1.69) | 1.03 | (1.79) | 1.08 | (1.87) | 1.14 | (1.96) | 1.21 | (2.06) |
| 25 | Wisconsin | 0.57 | (1.52) | 0.56 | (1.48) | 0.60 | (1.55) | 0.64 | (1.63) | 0.69 | (1.74) | 0.73 | (1.82) | 0.75 | (1.88) | 0.77 | (1.93) |
| 26 | Kansas | 0.56 | (1.43) | 0.55 | (1.37) | 0.58 | (1.42) | 0.62 | (1.5) | 0.66 | (1.59) | 0.70 | (1.66) | 0.73 | (1.72) | 0.77 | (1.78) |
| 27 | Oregon | 0.59 | (1.41) | 0.57 | (1.35) | 0.60 | (1.4) | 0.65 | (1.5) | 0.73 | (1.65) | 0.79 | (1.76) | 0.84 | (1.86) | 0.87 | (1.94) |
| 28 | South Carolina | 0.58 | (1.32) | 0.60 | (1.32) | 0.66 | (1.4) | 0.73 | (1.52) | 0.81 | (1.67) | 0.87 | (1.79) | 0.94 | (1.91) | 1.01 | (2.03) |
| 29 | Oklahoma | 0.50 | (1.12) | 0.50 | (1.11) | 0.53 | (1.16) | 0.58 | (1.25) | 0.63 | (1.35) | 0.67 | (1.43) | 0.70 | (1.49) | 0.73 | (1.55) |
| 30 | Louisiana | 0.48 | (1.06) | 0.48 | (1.04) | 0.51 | (1.09) | 0.54 | (1.16) | 0.58 | (1.24) | 0.61 | (1.3) | 0.64 | (1.36) | 0.67 | (1.42) |
| 31 | Utah | 0.40 | (1.04) | 0.39 | (1.02) | 0.41 | (1.07) | 0.44 | (1.15) | 0.48 | (1.24) | 0.50 | (1.31) | 0.53 | (1.38) | 0.55 | (1.44) |
| 32 | New Hampshire | 0.35 | (0.94) | 0.34 | (0.91) | 0.34 | (0.93) | 0.37 | (0.99) | 0.39 | (1.07) | 0.41 | (1.13) | 0.43 | (1.17) | 0.45 | (1.22) |
| 33 | Nebraska | 0.40 | (0.79) | 0.41 | (0.79) | 0.42 | (0.82) | 0.45 | (0.87) | 0.47 | (0.92) | 0.49 | (0.96) | 0.52 | (1) | 0.54 | (1.05) |
| 34 | Mississippi | 0.35 | (0.82) | 0.34 | (0.79) | 0.36 | (0.81) | 0.38 | (0.86) | 0.40 | (0.92) | 0.42 | (0.95) | 0.44 | (0.99) | 0.46 | (1.03) |

Table H-5: U.S. ITS Revenue by State(in billions of USD, ranked on CY 2009 end-use ITS)

| Rank | State | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|------|----------------------|---------------|------------------|---------------|------------------|---------------|------------------|--------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|
| | | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* | End-use | ITS Value Chain* |
| 35 | Iowa | 0.32 | (0.74) | 0.32 | (0.73) | 0.35 | (0.76) | 0.36 | (0.8) | 0.38 | (0.84) | 0.40 | (0.87) | 0.41 | (0.9) | 0.42 | (0.92) |
| 36 | New Mexico | 0.29 | (0.74) | 0.27 | (0.7) | 0.29 | (0.72) | 0.31 | (0.77) | 0.34 | (0.84) | 0.36 | (0.9) | 0.38 | (0.95) | 0.41 | (1) |
| 37 | District of Columbia | 0.28 | (0.72) | 0.27 | (0.7) | 0.28 | (0.72) | 0.30 | (0.77) | 0.32 | (0.81) | 0.34 | (0.85) | 0.35 | (0.88) | 0.37 | (0.92) |
| 38 | Arkansas | 0.29 | (0.69) | 0.29 | (0.67) | 0.30 | (0.69) | 0.33 | (0.73) | 0.36 | (0.79) | 0.39 | (0.83) | 0.41 | (0.86) | 0.42 | (0.89) |
| 39 | Nevada | 0.30 | (0.68) | 0.29 | (0.66) | 0.30 | (0.68) | 0.31 | (0.73) | 0.34 | (0.78) | 0.36 | (0.83) | 0.38 | (0.87) | 0.40 | (0.9) |
| 40 | Idaho | 0.26 | (0.55) | 0.24 | (0.51) | 0.24 | (0.52) | 0.25 | (0.56) | 0.27 | (0.61) | 0.29 | (0.64) | 0.29 | (0.67) | 0.31 | (0.7) |
| 41 | Rhode Island | 0.18 | (0.47) | 0.17 | (0.46) | 0.18 | (0.48) | 0.19 | (0.5) | 0.20 | (0.54) | 0.22 | (0.57) | 0.23 | (0.6) | 0.24 | (0.63) |
| 42 | West Virginia | 0.19 | (0.47) | 0.18 | (0.45) | 0.19 | (0.47) | 0.20 | (0.49) | 0.21 | (0.52) | 0.22 | (0.55) | 0.23 | (0.57) | 0.24 | (0.6) |
| 43 | Delaware | 0.24 | (0.49) | 0.21 | (0.45) | 0.22 | (0.47) | 0.23 | (0.5) | 0.25 | (0.53) | 0.26 | (0.55) | 0.27 | (0.58) | 0.28 | (0.59) |
| 44 | Maine | 0.17 | (0.42) | 0.16 | (0.41) | 0.17 | (0.42) | 0.18 | (0.44) | 0.19 | (0.48) | 0.21 | (0.5) | 0.22 | (0.52) | 0.22 | (0.54) |
| 45 | Hawaii | 0.17 | (0.4) | 0.17 | (0.39) | 0.17 | (0.4) | 0.18 | (0.42) | 0.19 | (0.45) | 0.20 | (0.47) | 0.21 | (0.49) | 0.22 | (0.51) |
| 46 | Vermont | 0.11 | (0.35) | 0.11 | (0.34) | 0.11 | (0.35) | 0.12 | (0.37) | 0.13 | (0.4) | 0.14 | (0.43) | 0.15 | (0.45) | 0.15 | (0.47) |
| 47 | Alaska | 0.13 | (0.3) | 0.13 | (0.3) | 0.13 | (0.31) | 0.14 | (0.33) | 0.15 | (0.35) | 0.16 | (0.37) | 0.17 | (0.38) | 0.17 | (0.4) |
| 48 | South Dakota | 0.13 | (0.3) | 0.13 | (0.29) | 0.14 | (0.3) | 0.15 | (0.32) | 0.16 | (0.35) | 0.17 | (0.37) | 0.18 | (0.38) | 0.18 | (0.4) |
| 49 | Montana | 0.12 | (0.28) | 0.12 | (0.27) | 0.12 | (0.28) | 0.13 | (0.3) | 0.14 | (0.32) | 0.15 | (0.34) | 0.16 | (0.36) | 0.17 | (0.37) |
| 50 | North Dakota | 0.10 | (0.23) | 0.10 | (0.23) | 0.11 | (0.24) | 0.12 | (0.26) | 0.13 | (0.28) | 0.14 | (0.3) | 0.14 | (0.31) | 0.15 | (0.32) |
| 51 | Wyoming | 0.10 | (0.19) | 0.10 | (0.19) | 0.10 | (0.19) | 0.11 | (0.21) | 0.12 | (0.23) | 0.12 | (0.24) | 0.13 | (0.25) | 0.14 | (0.26) |
| | Total | 48.884 | (114.99) | 47.888 | (111.81) | 50.459 | (116.72) | 53.81 | (124.16) | 57.981 | (133.27) | 61.274 | (140.41) | 64.336 | (146.95) | 67.291 | (153.14) |

Table H-6: U.S. *ITS*-related Revenue Categorized by NAICS code and Market Segment (in billions of USD, CY 2009)

| NAICS Code | NAICS Title | End-Use Products and Services | Enabling Services | Components | Total |
|------------|---|-------------------------------|-------------------|------------|-------------|
| 237130 | Power and Communication Line and Related Structures Construction | 0.68 | 0.00 | 0.00 | 0.68 |
| 237310 | Highway, Street, and Bridge Construction | 1.18 | 0.00 | 0.00 | 1.18 |
| 238210 | Electrical Contractors and Other Wiring Installation Contractors | 1.47 | 0.00 | 0.00 | 1.47 |
| 238990 | All Other Specialty Trade Contractors | 0.38 | 0.00 | 0.00 | 0.38 |
| 333314 | Optical Instrument and Lens Manufacturing | 0.20 | 0.00 | 0.08 | 0.28 |
| 333315 | Photographic and Photocopying Equipment Manufacturing | 0.11 | 0.00 | 0.00 | 0.11 |
| 333319 | Other Commercial and Service Industry Machinery Manufacturing | 0.00 | 0.00 | 0.35 | 0.35 |
| 333999 | All Other Miscellaneous General Purpose Machinery Manufacturing | 0.00 | 0.00 | 0.25 | 0.25 |
| 334111 | Electronic Computer Manufacturing | 2.90 | 0.00 | 0.00 | 2.90 |
| 334112 | Computer Storage Device Manufacturing | 0.44 | 0.00 | 0.00 | 0.44 |
| 334113 | Computer Terminal Manufacturing | 0.41 | 0.00 | 0.00 | 0.41 |
| 334119 | Other Computer Peripheral Equipment Manufacturing | 1.16 | 0.00 | 0.00 | 1.16 |
| 334210 | Telephone Apparatus Manufacturing | 1.45 | 0.00 | 0.00 | 1.45 |
| 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing | 3.13 | 0.00 | 0.00 | 3.13 |
| 334290 | Other Communications Equipment Manufacturing | 0.94 | 0.00 | 0.00 | 0.94 |
| 334310 | Audio and Video Equipment Manufacturing | 0.55 | 0.00 | 0.00 | 0.55 |
| 334411 | Electron Tube Manufacturing | 0.00 | 0.00 | 0.08 | 0.08 |
| 334412 | Bare Printed Circuit Board Manufacturing | 0.00 | 0.00 | 0.37 | 0.37 |
| 334413 | Semiconductor and Related Device Manufacturing | 0.00 | 0.00 | 1.99 | 1.99 |
| 334414 | Electronic Capacitor Manufacturing | 0.00 | 0.00 | 0.10 | 0.10 |
| 334415 | Electronic Resistor Manufacturing | 0.00 | 0.00 | 0.08 | 0.08 |
| 334416 | Electronic Coil, Transformer, and Other Inductor Manufacturing | 0.00 | 0.00 | 0.16 | 0.16 |

Table H-6: U.S. ITS-related Revenue Categorized by NAICS code and Market Segment (in billions of USD, CY 2009)

| NAICS Code | NAICS Title | End-Use Products and Services | Enabling Services | Components | Total |
|------------|--|-------------------------------|-------------------|------------|-------------|
| 334417 | Electronic Connector Manufacturing | 0.00 | 0.00 | 0.44 | 0.44 |
| 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing | 0.00 | 0.00 | 0.89 | 0.89 |
| 334419 | Other Electronic Component Manufacturing | 0.00 | 0.00 | 1.00 | 1.00 |
| 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing | 1.43 | 0.00 | 3.33 | 4.76 |
| 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use | 0.00 | 0.00 | 0.35 | 0.35 |
| 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables | 0.52 | 0.00 | 0.70 | 1.22 |
| 334514 | Totalizing Fluid Meter and Counting Device Manufacturing | 0.00 | 0.00 | 0.24 | 0.24 |
| 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals | 0.00 | 0.00 | 0.93 | 0.93 |
| 334516 | Analytical Laboratory Instrument Manufacturing | 0.00 | 0.00 | 0.35 | 0.35 |
| 334517 | Irradiation Apparatus Manufacturing | 0.00 | 0.00 | 0.32 | 0.32 |
| 334518 | Watch, Clock, and Part Manufacturing | 0.00 | 0.00 | 0.05 | 0.05 |
| 334519 | Other Measuring and Controlling Device Manufacturing | 0.73 | 0.00 | 0.26 | 0.99 |
| 335122 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing | 0.14 | 0.00 | 0.00 | 0.14 |
| 335311 | Power, Distribution, and Specialty Transformer Manufacturing | 0.00 | 0.00 | 0.20 | 0.20 |
| 335314 | Relay and Industrial Control Manufacturing | 0.18 | 0.00 | 0.73 | 0.91 |
| 335921 | Fiber Optic Cable Manufacturing | 0.00 | 0.00 | 0.11 | 0.11 |
| 335929 | Other Communication and Energy Wire Manufacturing | 0.00 | 0.00 | 0.35 | 0.35 |
| 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing | 0.00 | 0.00 | 0.80 | 0.80 |
| 3361_2 | Motor Vehicle Manufacturing | 4.25 | 0.00 | 0.00 | 4.25 |
| 336321 | Vehicular Lighting Equipment Manufacturing | 0.00 | 0.00 | 0.14 | 0.14 |
| 336322 | Other Motor Vehicle Electrical and Electronic Equipment Manufacturing | 0.00 | 0.00 | 0.50 | 0.50 |
| 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing | 0.18 | 0.00 | 0.00 | 0.18 |

Table H-6: U.S. ITS-related Revenue Categorized by NAICS code and Market Segment (in billions of USD, CY 2009)

| NAICS Code | NAICS Title | End-Use Products and Services | Enabling Services | Components | Total |
|------------|---|-------------------------------|-------------------|------------|--------------|
| 336340 | Motor Vehicle Brake System Manufacturing | 0.30 | 0.00 | 0.00 | 0.30 |
| 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing | 0.34 | 0.00 | 0.00 | 0.34 |
| 336399 | All Other Motor Vehicle Parts Manufacturing | 0.00 | 0.00 | 1.88 | 1.88 |
| 339950 | Sign Manufacturing | 0.36 | 0.00 | 0.00 | 0.36 |
| 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers | 0.12 | 0.43 | 0.00 | 0.55 |
| 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers | 0.32 | 1.08 | 0.00 | 1.40 |
| 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers | 0.44 | 1.51 | 0.00 | 1.95 |
| 423620 | Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers | 0.09 | 0.31 | 0.00 | 0.40 |
| 423690 | Other Electronic Parts and Equipment Merchant Wholesalers | 0.32 | 1.09 | 0.00 | 1.41 |
| 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers | 0.07 | 0.26 | 0.00 | 0.33 |
| 488111 | Air Traffic Control | 0.00 | 0.00 | 0.01 | 0.01 |
| 488210 | Support Activities for Rail Transportation | 0.36 | 0.00 | 0.00 | 0.36 |
| 488330 | Navigational Services to Shipping | 0.07 | 0.00 | 0.00 | 0.07 |
| 488490 | Other Support Activities for Road Transportation | 0.24 | 0.00 | 0.00 | 0.24 |
| 488999 | All Other Support Activities for Transportation | 0.06 | 0.00 | 0.00 | 0.06 |
| 515111 | Radio Networks | 0.36 | 0.00 | 0.00 | 0.36 |
| 517110 | Wired Telecommunications Carriers | 3.06 | 10.39 | 0.00 | 13.45 |
| 517210 | Wireless Telecommunications Carriers (except Satellite) | 1.21 | 4.13 | 0.00 | 5.34 |
| 517410 | Satellite Telecommunications | 0.12 | 0.41 | 0.00 | 0.53 |
| 517911 | Telecommunications Resellers | 0.16 | 0.55 | 0.00 | 0.71 |
| 517919 | All Other Telecommunications | 0.32 | 1.08 | 0.00 | 1.40 |
| 518210 | Data Processing, Hosting, and Related Services | 2.07 | 2.67 | 0.00 | 4.74 |

Table H-6: U.S. *ITS*-related Revenue Categorized by NAICS code and Market Segment (in billions of USD, CY 2009)

| NAICS Code | NAICS Title | End-Use Products and Services | Enabling Services | Components | Total |
|------------|--|-------------------------------|-------------------|--------------|---------------|
| 541310 | Architectural Services | 0.16 | 0.93 | 0.00 | 1.09 |
| 541330 | Engineering Services | 1.64 | 9.47 | 0.00 | 11.11 |
| 541340 | Drafting Services | 0.02 | 0.14 | 0.00 | 0.16 |
| 541370 | Surveying and Mapping (except Geophysical) Services | 0.56 | 0.00 | 0.00 | 0.56 |
| 541511 | Custom Computer Programming Services | 2.47 | 3.88 | 0.00 | 6.35 |
| 541512 | Computer Systems Design Services | 4.94 | 3.71 | 0.00 | 8.65 |
| 541513 | Computer Facilities Management Services | 0.19 | 0.28 | 0.00 | 0.47 |
| 541519 | Other Computer Related Services | 0.39 | 0.55 | 0.00 | 0.94 |
| 541611 | Administrative Management and General Management Consulting Services | 0.42 | 0.75 | 0.00 | 1.17 |
| 541614 | Process, Physical Distribution, and Logistics Consulting Services | 0.93 | 0.00 | 0.00 | 0.93 |
| 541618 | Other Management Consulting Services | 0.17 | 0.30 | 0.00 | 0.47 |
| 541690 | Other Scientific and Technical Consulting Services | 0.65 | 0.45 | 0.00 | 1.10 |
| 541820 | Public Relations Agencies | 0.06 | 0.27 | 0.00 | 0.33 |
| 541990 | All Other Professional, Scientific, and Technical Services | 0.07 | 0.29 | 0.00 | 0.36 |
| 561110 | Office Administrative Services | 0.38 | 0.62 | 0.00 | 1.00 |
| 561499 | All Other Business Support Services | 0.10 | 0.37 | 0.00 | 0.47 |
| 561990 | All Other Support Services | 0.24 | 0.41 | 0.00 | 0.65 |
| 811212 | Computer and Office Machine Repair and Maintenance | 0.66 | 0.24 | 0.00 | 0.90 |
| 811213 | Communication Equipment Repair and Maintenance | 0.32 | 0.11 | 0.00 | 0.43 |
| 811219 | Other Electronic and Precision Equipment Repair and Maintenance | 0.69 | 0.25 | 0.00 | 0.94 |
| Totals | | 47.90 | 46.91 | 17.04 | 111.85 |

Table H-7: ITS Value Chain* Employment by State (ranked on CY 2009)

| Rank | State | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|--------------|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1 | California | 56,560 | 54,330 | 54,649 | 56,038 | 57,495 | 58,838 | 59,714 | 60,168 |
| 2 | Texas | 35,213 | 33,919 | 33,659 | 34,465 | 35,434 | 36,212 | 36,779 | 37,185 |
| 3 | Virginia | 27,785 | 27,242 | 27,346 | 27,678 | 28,820 | 29,779 | 30,516 | 31,230 |
| 4 | Florida | 22,911 | 21,974 | 21,835 | 22,409 | 23,305 | 24,148 | 24,797 | 25,224 |
| 5 | New York | 20,658 | 19,948 | 20,014 | 20,425 | 21,042 | 21,586 | 21,989 | 22,226 |
| 6 | New Jersey | 17,468 | 16,793 | 16,970 | 17,332 | 17,835 | 18,310 | 18,643 | 18,888 |
| 7 | Maryland | 17,122 | 16,753 | 16,812 | 16,969 | 17,288 | 17,611 | 17,814 | 17,958 |
| 8 | Massachusetts | 17,236 | 16,716 | 16,880 | 17,096 | 17,423 | 17,721 | 17,897 | 18,033 |
| 9 | Pennsylvania | 17,289 | 16,698 | 16,880 | 17,356 | 17,890 | 18,391 | 18,719 | 19,029 |
| 10 | Illinois | 16,899 | 16,254 | 16,282 | 16,883 | 17,609 | 18,080 | 18,392 | 18,647 |
| 11 | Michigan | 16,891 | 15,634 | 15,726 | 16,046 | 16,658 | 17,276 | 17,704 | 18,029 |
| 12 | Ohio | 14,078 | 13,500 | 13,661 | 13,896 | 14,361 | 14,823 | 15,167 | 15,438 |
| 13 | Georgia | 14,085 | 13,488 | 13,447 | 13,930 | 14,508 | 15,103 | 15,506 | 15,833 |
| 14 | Colorado | 12,333 | 11,626 | 11,542 | 11,782 | 12,137 | 12,381 | 12,496 | 12,600 |
| 15 | North Carolina | 11,739 | 11,049 | 10,904 | 11,107 | 11,467 | 11,763 | 11,983 | 12,182 |
| 16 | Washington | 10,207 | 9,888 | 9,801 | 9,884 | 10,197 | 10,460 | 10,618 | 10,746 |
| 17 | Missouri | 9,533 | 9,346 | 9,459 | 9,695 | 9,994 | 10,187 | 10,240 | 10,313 |
| 18 | Arizona | 8,496 | 7,930 | 8,010 | 8,125 | 8,316 | 8,547 | 8,776 | 8,934 |
| 19 | Indiana | 8,113 | 7,668 | 7,836 | 7,952 | 8,175 | 8,433 | 8,692 | 8,909 |
| 20 | Connecticut | 7,737 | 7,507 | 7,512 | 7,571 | 7,672 | 7,806 | 7,903 | 8,000 |
| 21 | Minnesota | 7,856 | 7,483 | 7,624 | 7,830 | 8,081 | 8,326 | 8,580 | 8,726 |
| 22 | Alabama | 6,961 | 6,648 | 6,750 | 6,919 | 7,125 | 7,427 | 7,620 | 7,793 |
| 23 | Tennessee | 6,366 | 6,062 | 6,032 | 6,184 | 6,445 | 6,650 | 6,769 | 6,914 |
| 24 | Wisconsin | 5,966 | 5,667 | 5,778 | 5,816 | 5,934 | 6,074 | 6,220 | 6,432 |
| 25 | Oregon | 5,613 | 5,284 | 5,230 | 5,261 | 5,377 | 5,491 | 5,593 | 5,688 |
| 26 | South Carolina | 4,887 | 4,883 | 4,967 | 5,080 | 5,299 | 5,495 | 5,653 | 5,764 |
| 27 | Utah | 4,848 | 4,680 | 4,761 | 4,897 | 5,110 | 5,304 | 5,453 | 5,578 |
| 28 | Kansas | 4,929 | 4,659 | 4,646 | 4,831 | 5,076 | 5,272 | 5,365 | 5,470 |
| 29 | Kentucky | 4,762 | 4,533 | 4,590 | 4,675 | 4,808 | 4,968 | 5,081 | 5,182 |
| 30 | Oklahoma | 4,312 | 4,109 | 4,102 | 4,235 | 4,416 | 4,534 | 4,610 | 4,708 |
| 31 | New Hampshire | 3,924 | 3,768 | 3,836 | 3,840 | 3,843 | 3,884 | 3,915 | 3,936 |
| 32 | Louisiana | 3,466 | 3,378 | 3,355 | 3,455 | 3,577 | 3,703 | 3,776 | 3,846 |
| 33 | District of Columbia | 3,400 | 3,324 | 3,347 | 3,470 | 3,580 | 3,705 | 3,771 | 3,875 |
| 34 | Nebraska | 3,259 | 3,174 | 3,196 | 3,245 | 3,324 | 3,413 | 3,461 | 3,563 |
| 35 | New Mexico | 3,294 | 3,152 | 3,149 | 3,195 | 3,287 | 3,342 | 3,381 | 3,421 |
| 36 | Iowa | 3,190 | 2,965 | 3,050 | 3,118 | 3,209 | 3,268 | 3,347 | 3,444 |
| 37 | Mississippi | 2,703 | 2,571 | 2,530 | 2,577 | 2,661 | 2,725 | 2,786 | 2,839 |
| 38 | Nevada | 2,618 | 2,528 | 2,532 | 2,608 | 2,709 | 2,817 | 2,875 | 2,949 |
| 39 | Arkansas | 2,272 | 2,217 | 2,232 | 2,291 | 2,384 | 2,458 | 2,498 | 2,552 |
| 40 | Rhode Island | 2,092 | 2,028 | 2,034 | 2,074 | 2,167 | 2,250 | 2,296 | 2,320 |
| 41 | Idaho | 2,043 | 1,937 | 1,951 | 2,017 | 2,078 | 2,132 | 2,180 | 2,213 |
| 42 | Hawaii | 1,623 | 1,593 | 1,607 | 1,651 | 1,703 | 1,755 | 1,789 | 1,824 |
| 43 | Delaware | 1,756 | 1,580 | 1,550 | 1,583 | 1,635 | 1,675 | 1,696 | 1,720 |
| 44 | Maine | 1,579 | 1,530 | 1,534 | 1,567 | 1,633 | 1,682 | 1,716 | 1,754 |
| 45 | West Virginia | 1,491 | 1,449 | 1,455 | 1,485 | 1,548 | 1,605 | 1,634 | 1,660 |
| 46 | Vermont | 1,368 | 1,298 | 1,296 | 1,321 | 1,366 | 1,400 | 1,436 | 1,458 |
| 47 | Montana | 1,111 | 1,082 | 1,099 | 1,150 | 1,217 | 1,274 | 1,318 | 1,357 |
| 48 | South Dakota | 1,146 | 1,081 | 1,100 | 1,125 | 1,161 | 1,207 | 1,240 | 1,270 |
| 49 | Alaska | 974 | 993 | 1,000 | 1,030 | 1,072 | 1,107 | 1,132 | 1,158 |
| 50 | North Dakota | 966 | 947 | 934 | 963 | 1,011 | 1,055 | 1,093 | 1,135 |
| 51 | Wyoming | 590 | 576 | 571 | 592 | 618 | 635 | 649 | 668 |
| Total | | 463,716 | 445,442 | 447,061 | 456,726 | 471,079 | 484,087 | 493,274 | 500,786 |

