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Gardner Transportation Systems Business Unit

Status Report for Freeway Operations Committee
Siemens – Gardner Transportation Systems (SGTS)
January, 2002

Freeway Management Handbook Update: FHWA

SGTS staff are managing this FHWA project to update the Freeway Management Handbook to reflect the significant changes that have occurred in the state-of-the-practice since the mid 90's (e.g., the National ITS Architecture, NTCIP Standards, the internet and other new technologies, a greater focus on "operations") The effort includes assessing the current document, identifying proposed changes, and performing the necessary revisions. The revisions themselves may be minor modifications, significant rewrites, and possibly the addition of new modules. The proposed approach is to develop the updated Handbook in a Web-based format and "publish" the document on the Internet, with referenced links to other web sites / documents for additional and more detailed information. The updated Freeway Management Handbook is scheduled to be completed in December, 2002.

Information Requirements for the National Highway System ("INFOSTRUCTURE"): FHWA

SGTS staff are assisting the Federal Highway Administration (FHWA) Joint ITS Program Office in determining what minimum information should be required from a 21st century highway. The effort includes preparation of high-level requirement matrices identifying the types of information required and/or useful to support various traffic management functions (e.g., traffic control, incident management, infrastructure security, military deployment, winter mobility, emergency evacuation) the level of accuracy for these information elements, and the nominal spacing of the associated data collection devices. Cost estimates are also being developed for deploying and operating such a nationwide system. This information will help shape FHWA efforts to develop technical and policy guidance for information collection in support of transportation management services.

IMAJINE (Inter-Modal & Jurisdictional Integrated Network Environment) Demonstration Project: Los Angeles County MTA

The Los Angeles County Metropolitan Transportation Authority has installed a traffic control system and associated equipment for the demonstration of the benefits to be achieved through the integration of transportation systems as part of the Inter-Modal and Jurisdictional Integrated Network Environment (IMAJINE) project. Fifteen intersections on Firestone Boulevard in the City of South Gate were selected as the locations for the demonstration. SGTS supplied and installed an *icons*™ traffic control system, with links to the Caltrans' Freeway Management System and the County Transit Management System via a CORBA C2C interface. The *icons*™ system received incident information from the FMS and implements suitable arterial response plans. The TMS sends Bus location information (AVL) to icons™ which implements transit priority at the intersection being approached by the bus.

Birmingham, Alabama Advanced Traffic Management System: Alabama DOT

SGTS designed and is implementing the software for an ATMS system for the Birmingham, Alabama area that will eventually cover 60 miles of freeway. The system is currently operational with CCTV (53 cameras) and Video Detection (12 locations). 14 Dynamic Message Signs utilizing NTCIP for communications are now being installed. All devices are controlled from an interactive mapping application. Future enhancements will include Incident Tracking, Travel Time calculation, and additional cameras, signs, and vehicle detection devices.

Traffic Operations System (TOS) Enhancements: Caltrans District 4

SGTS is under contract with Caltrans District 4 to provide various enhancements to the Caltrans Traffic Operations System (TOS) in the San Francisco Bay Area to improve the surveillance coverage, reliability, and overall system utility. SGTS is responsible for activating additional freeway surveillance locations. Tasks include converting sites to wireless communications, configure and test all cabinet components, and configure for central data collection. Software enhancements are also being performed to the central processing and field components as part of an overall strategy of improving system capabilities and reliability. Finally, a strategic design document is being developed to guide future enhancements of the system.

Silicon Valley Smart Corridor: San Jose, CA

SGTS personnel designed and implemented a multi-jurisdictional and multi-modal transportation management system in Santa Clara County, California, involving a wide-area communications network for the real-time exchange of data and commands between traffic signal systems operated by the county and five cities, a freeway management system, a transit management system, and the TravInfo regional traveler information system. The network uses a mixture of full duplex Ethernet over agency owned fiber-optic cable and frame relay service. This project also includes an interface to Caltrans CT-NET system to extract data. In addition to center-to-center communications, the fiber optic network supports center-to-field communications for a variety of devices including traffic signals, dynamic message signs, count stations, and closed circuit television cameras.

Salt Lake Ramp Metering: Utah DOT

As part of its work to assist with the design and implementation of an advanced traffic management system (ATMS) in the Salt Lake area, SGTS is responsible for the design, development, and integration of ramp metering and freeway data collection firmware for the Model 2070 controller. The data collection capabilities include ramp detectors (demand, passage, queue), speed (traps & direct measurement), and error checking (erratic count, max presence, no activity). The ramp metering capabilities include fixed rate (TOD/DOW), traffic responsive, plan activation from central, queue override, dual lane ramp operation, advance warning sign operation, and monitoring of red violations.

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Mobile, Alabama Fog Warning System: Alabama DOT

SGTS participated in the design and implementation of the Fog Warning System on the Mobile Bayway – an 8-mile long bridge over the Mobile Bay. The Fog Warning System has fog detectors, CCTV cameras, and video detection cameras mounted at one-mile intervals on the bridge. When fog is detected, the system notifies the operator, and can automatically turn on flashing warning signs, change speed limit signs, and place messages on Dynamic Message Signs (DMS). SGTS role was to supervise the design and integration of the all system software, and to implement an NTCIP-based DMS control system, and a data collection system that logs vehicle data collected by the video detection system.

NTCIP Protocol Development

SGTS personnel have served on the NTCIP Joint Committee almost since its inception and currently chair the NTCIP Center-to-Center Protocol Working Group. Significant portions of the NTCIP standards, the updated NTCIP Guide, and the NTCIP training slides have been developed by SGTS, who also give seminars and training sessions of NTCIP standards. Siemens – Gardner Transportation Systems has been a leader in implementing NTCIP standards in traffic management systems.

SIEMENS Worldwide Activities

Siemens is on one of the most influential and innovative suppliers and integrators of traffic control systems in the world. Some of the recent freeway examples are briefly summarized below:

- A27 – A15 Motorway Project, Netherlands: Siemens was the general contractor for this project, which included 108 roadway stations, 16 detector stations, 375 variable message signs, 101 emergency power installations, and 265 km of cable.
- A2 / A3 Traffic Control System, Basel, Switzerland: A traffic control system for improving capacity and road safety, detection of faults, automatic traffic-responsive control, and variable lane allocation.
- A8, A99 Traffic Control System, Munich, Germany: Traffic control center for motorways and tunnels, including 33 measurement and display cross-sections.
- A9 Traffic Control System, Germany: System between Munich and Nuremberg, consisting of variable message signs, traffic sensors, as well as fog and ice detectors.
- German Motorway Surveillance: Initial roll out of 1000 “Traffic Eye” measuring stations. Traffic Eye is a Siemens product consisting of overhead detection via passive infrared, power from solar cells, and transmission of the collected data to a traffic control center by radio.
- **CONCERT**: Siemens’ CONCERT is a universal traffic management system designed to integrate numerous subsystems and components. Concert, which is being installed in Berlin, provides a variety of tasks and functions, including:
    - Organizer –CONCERT receives its input data from multiple subsystems and systems. Individual field detectors and devices may also be directly connected to CONCERT. By establishing an integrated network of data between multiple

subsystems / systems and managing this joint body of information, it functions as an “organizer” as well as a multi-functional information server.

- Visualization – CONCERT presents the traffic flow information, operational data, and device status in a clearly arranged fashion, integrated into a graphical presentation of the road network.
- Traffic Strategy Tool – From a knowledge of the current traffic flow and weather situation, taking into account manually entered / verified information regarding incident and work zone activities, CONCERT determines general stipulations for the control and coordination of subsystems. These operational recommendations (e.g., DMS messages, generation of information for the media) are based on situation – oriented action plans and strategies as developed and entered into the system by operators, and are forwarded to the appropriate subsystems (as suggestions) for implementation as appropriate.
- Media Specialist – Integrated and real – time traffic information is generated for a variety of traveler information services, such as dynamic message signs, radio and television, the Internet, in-vehicle navigation and guidance systems and pre-trip planning.

- **MONET**: Most advanced traffic management systems have information gaps – that is, areas and roadway segments where traffic flow information is not available, and /or the information of interest is not directly measured. The MONET subsystem closes these information gaps by means of intelligent traffic models. They estimate the traffic flow information for segments where traffic detectors have not been installed or where they have failed; and also enable calculation of various traffic effects (e.g., travel times, congestion, emissions). The calculations of MONET use digital road network models whose cartographic objects have been assigned various traffic attributes such as capacity, on / off ramp relationships, maximum speed, etc. The current traffic situation is estimated on the basis of dynamic route choice and traffic assignment models. The overall state of the roadway network is calculated every 5 to 15 minutes taking into account the state of the previous estimate. The calculation is based on traffic demand matrices and detector values. The MONET traffic models also provide a short – term traffic forecast based on the current traffic situation and historical data. Using a mesoscopic traffic simulation, 15 to 60 minute forecasts of the network state are calculated at 5 to 15 minute intervals.