6.0 Traveler Information Kiosks

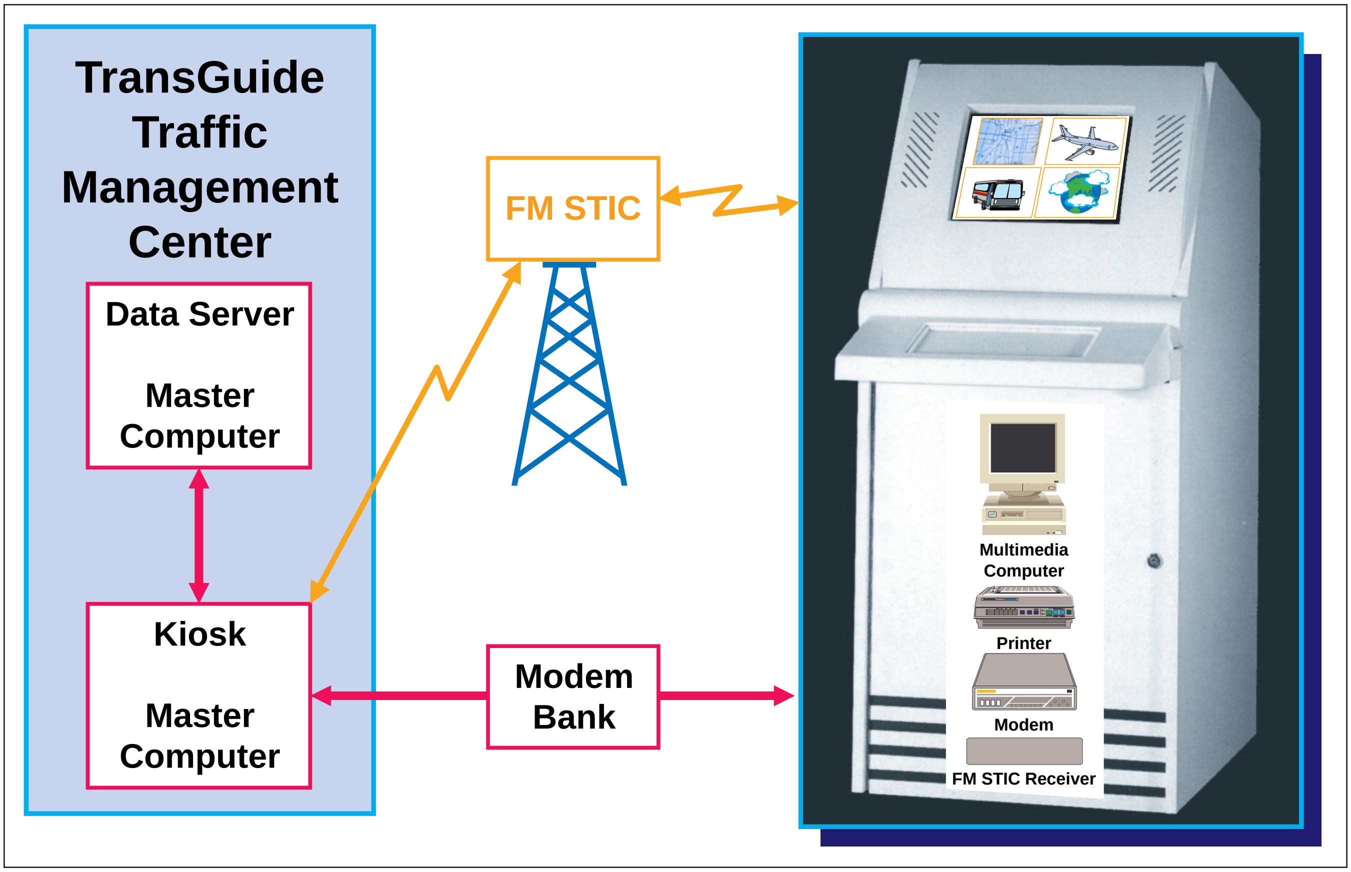

Figure 24. Kiosk Conceptual Overview

The Traveler Information Kiosk program was conceived as an Advanced Traveler Information System (ATIS) to provide the user with current traffic conditions, navigation instructions, transit information, airport information, and weather information.

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6.1 Overview

Conceptually, the Kiosk System Architecture is composed of the Master Computer and Kiosk Field Units. Figure 24 depicts the conceptual view of the Kiosk System. The basic concept of the Kiosk System is that the Kiosk Master Computer retrieves and distributes the data to the Kiosk Field Units and the Kiosk Field Units utilize the data to display information to users. The Kiosk System is to provide the traveling public with computer generated displays or printed hard copies of the following types of information:

- San Antonio street map
- Route guidance
- Real-time traffic conditions
- Weather

- Transit data
- Airport data

The Traveler Information Kiosk System was developed to disseminate information from a wide variety of data sources to the traveling public. The Kiosk System provides a focal point for the acquisition of this information and a convenient and easily used medium for its distribution. Travelers interact with the Kiosk System using touch-screen monitors and are able to request informative computer-generated displays as well as printed copies of the information.

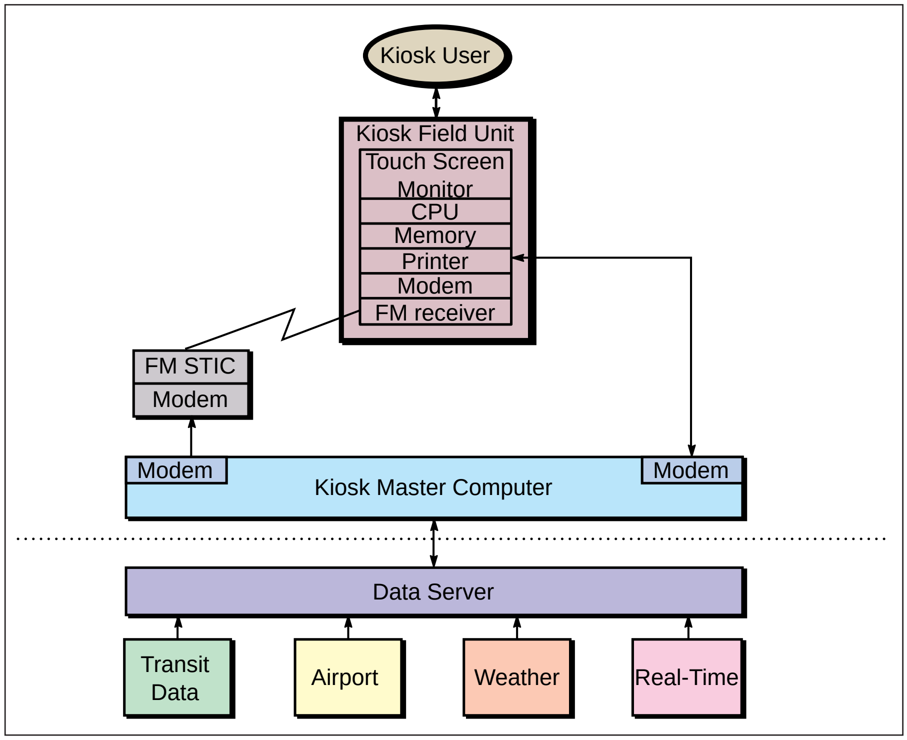

Figure 25. Kiosk System Architecture

6.2 Design Information

The Traveler Information Kiosk System is composed of two primary systems—the Kiosk Master Computer and the Kiosk Field Unit. Physically, the Kiosk Master Computer is comprised of multiple applications residing on multiple systems. These applications provide the necessary functions to retrieve and distribute the data utilized by the Kiosk Field Units. The Kiosk Field Units application software is the same on each Kiosk Field Unit. The application software uses configuration files located on the Kiosk Field Unit to identify the specific information unique to each Kiosk. Figure 25 shows the basic flow of information from the individual data sources to users of the Kiosk System.

6.2.1 System Architecture

The architecture of the Kiosk System, presented in Figure 25, is divided into the Kiosk Master Computer System and the Kiosk Field Unit System.

6.2.1.1 Kiosk Master Computer System

The Kiosk Master Computer System is comprised of multiple applications and functions residing on multiple systems. The Kiosk Master Computer executes on a Sun Microsystems workstation. The application is developed using the C programming language. The applications and functions together conceptually form the Kiosk Master Computer Subsystem. The Kiosk Master Computer consists of the Status GUI, Detailed Status GUI, System Maintenance GUI, Status Logger, Data Server Interface, and Kiosk Main process. These subsystems are depicted in Figure 26.

The Status GUI displays the current status of the Kiosk applications executing on the Kiosk Master Computer. The Detailed Status GUI, which is invoked from the Status GUI, displays the current state and detailed status information for each Kiosk Field Unit. This information includes the usage statistics (i.e., the number of times each screen has been accessed by users) for each Kiosk Field Unit as well as the overall status of the Kiosk Field Unit.

The System Maintenance GUI provides the capability to modify airport files and the screen-saver control file. These files are maintained manually by the TransGuide operations staff. After the files are modified, they are downloaded to each Kiosk Field Unit through the analog modem.

The Status Logger logs messages sent to it from the other Kiosk applications executing on the Kiosk Master Computer. The Status Logger is used to

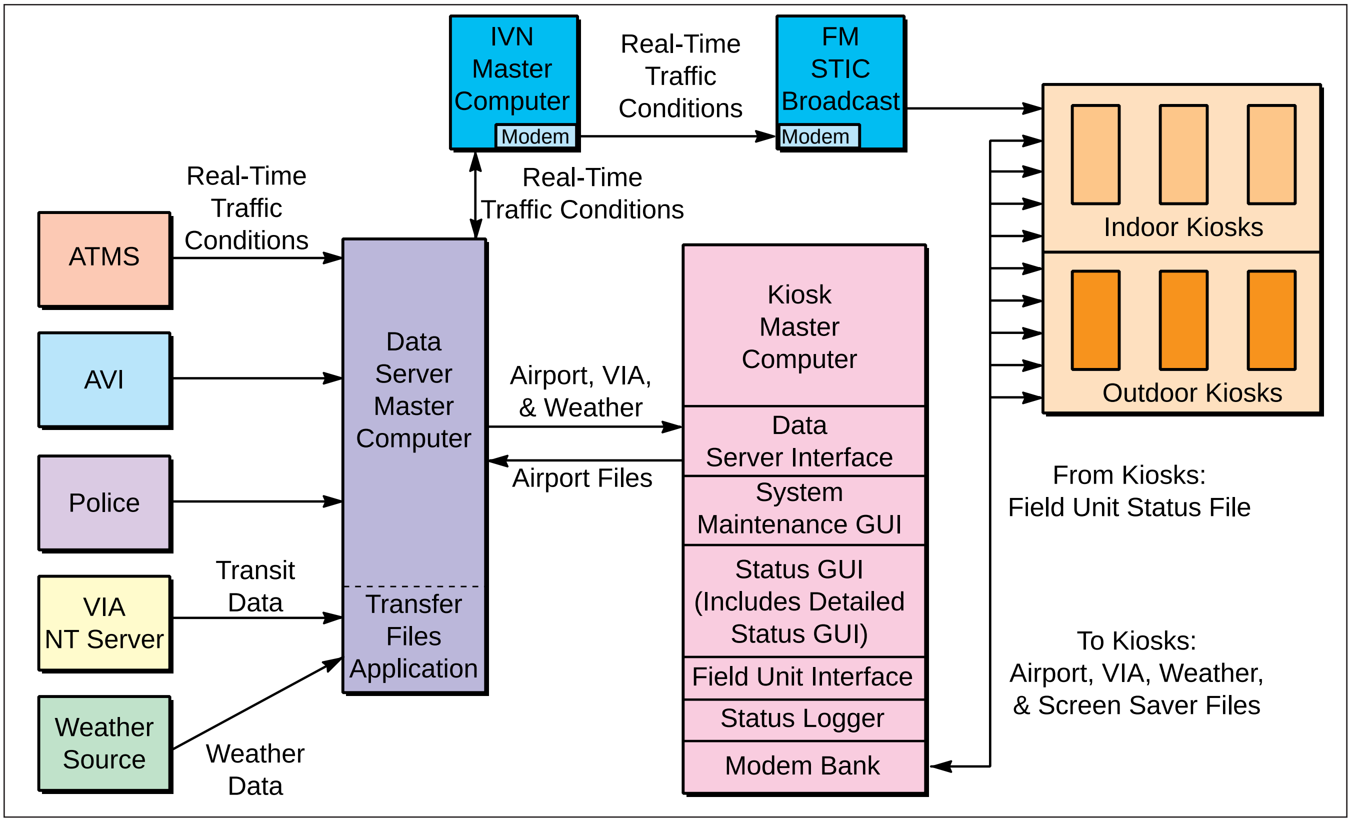

Figure 26. Kiosk Subsystem Architecture

troubleshoot and diagnosis the Kiosk Master Computer.

The Data Server Interface provides the interface between the Data Server and the Kiosk applications executing on the Kiosk Master Computer. All data is transferred through this interface for transmission to each of the Kiosk Field Units.

The Kiosk main process retrieves data from the Data Server and transmits the data files to the Field Units. Each time the Master Computer connects to a Kiosk Field Unit, nominally every hour, the status data from each field unit will be returned to the Kiosk Master Computer.

6.2.1.2 Kiosk Field Unit System

The Kiosk Field Unit System is composed of multiple applications residing on the Kiosk Field Unit computer. The applications were developed for a Windows 95™ environment in Microsoft Visual Basic and Environmental Systems Research Institute (ESRI) Map Objects. The Kiosk Field Unit System consists of the Error Server Program, the Kiosk-Filed Unit GUI program, and the Real-Time Data Receipt program. These subsystems are depicted in Figure 27.

The Error Server Program is responsible for the overall control and monitoring of the Kiosk Field Unit software. This program monitors the health and status of the Kiosk Field Unit and maintains error logs for the entire Kiosk Field Unit. The Error Server Program will perform any necessary process or system restarts. For example, the Kiosk Field Unit is restarted by the Error Server Program every day at midnight to assure stable operation.

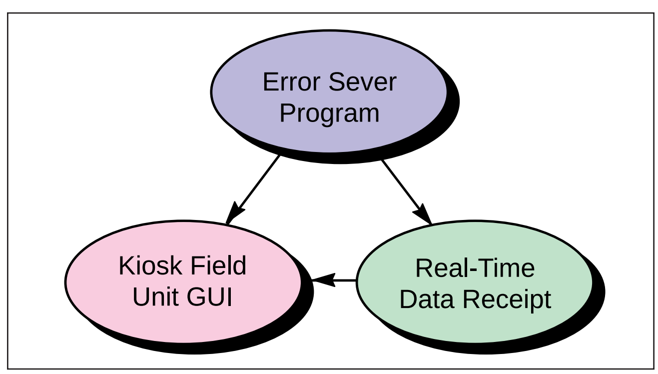

Figure 27. Kiosk Field Unit System

The Kiosk Field Unit GUI provides the interface to the Kiosk user. The program controls both the direct user interface and the display of the screen saver. Sample screens and functionality descriptions are provided later in this report.

The Real-Time Data Receipt program is responsible for serial communications. Two types of serial communication occur with the Kiosk Field Unit. The first is the receipt of the data from the Scientific Atlanta FM STIC receiver. These data are received at 9600 baud over a standard RS-232C serial port. The data stream contains the real-time traffic information, including link speed and incident information. The program also communicates with the Kiosk Master Computer. The Kiosk Master Computer calls the Kiosk Field Unit, typically each hour, to request a status update and to download any data files that may have changed (typically weather or transit files). The data are transferred to the Kiosk Field Unit GUI for presentation to the user.

6.2.2 Kiosk Field Unit Hardware Components

Two configurations of Kiosk Field Units were designed, one for indoor and one for outdoor use. The functional requirements were the same for both Kiosk models. The Kiosk Field Units were developed for user compatibility, functionality, and aesthetics. The Kiosk Field Units were selected and designed to comply with the Americans with Disabilities Act of 1990. In addition, the Kiosk Field Units provide for a lock-secure environment for the housed components. Each unit includes:

- Computer (150 MHz Intel Pentium processor)
- Touch-screen monitor
- Speakers
- Printer
- Antenna/receiver assembly
- Cooling/heating subsystems
- Modem

Factura Kiosks, Inc. supplied and integrated the enclosures for both the indoor and outdoor units. The indoor Kiosk Field Units, which are being placed in controlled environments, are rated for an ambient temperature range of 60° to 85°F. The noncondensing humidity range is specified at 35 to 85 percent relative humidity. Indoor Kiosk Field Units require only an internal cooling fan.

The outdoor Kiosk Field Units are rated for an ambient temperature range of -10° to 115°F. The noncondensing humidity range is specified at 20 to 100 percent relative humidity. The outdoor Kiosk Field Unit requires a thermostatically controlled cooling/heating system. The cooling provides for dehumidification as well. The outdoor Kiosks require shielding from direct sunlight onto the display monitor for readability purposes.

A Compaq Presario serves as the host computer for the Kiosk Field Unit. A Mitsubishi 17-inch monitor was chosen for its high-quality image and product reputation. Glare, flickering, and presentation of the image in an outdoor environment were criteria used in this selection. MicroTouch Systems, Inc., provided the touch screen for both units. The screen uses patented capacitive sensor technology, which allows for the thickest practical Lexan cover. The Lexan material is selected for its impact strength, durability, and transparency to provide for vandal- and weather-resistant attributes. The indoor unit uses the regular Capacitive Touchscreen, while the outdoor unit uses the MicroTouch ThruGlass Touchsensor. Scientific-Atlanta provided the FM STIC receiver.

On the indoor Kiosk Field Unit, the antenna is mounted inside the enclosure to reduce vandalism on the unit. On the outdoor Kiosk Field Unit, due to the metal enclosure which attenuates the FM signal, the antenna is securely mounted to the outside of the unit using a protective cover to deter vandalism.

The printer is a Magnetec thermal printer. The paper comes in 4.435-inch by 650-foot rolls and can print at a rate of 789 characters per second, with 80 characters per line. Power and communication access are provided by industry standard electrical and communication external connections.

6.2.3 Translation Table

An application was developed using MatLab to create a translation table, which is used when rendering current traffic conditions on the map. This translation table is a mapping between TransGuide LinkIDs (which are segments of roadway nominally one-half mile in length) to Navigation Technology LinkIDs (which are segments of roadway that vary in length based on navigation decision points). Traffic data are broadcast over the FM STIC using the latitude/longitude endpoints of the TransGuide LinkIDs. Performing a dynamic lookup based on latitude/longitude was not feasible given the computing power of the Kiosk Field Unit. The translation table allows a computation efficient table lookup routine to be used when real-time traffic data are received at the Kiosk Field Unit. The translation table is loaded on each Kiosk Field Unit each time a new Navigation Technologies database release is implemented. The In-Vehicle Navigation Units discussed previously in this document also use the same translation table.

6.2.4 Sample Field Unit Screens

The screens layout and functionality of the field unit screens were designed through a series of meetings with focus groups. These focus groups recommended Kiosk requirements, and screens were implemented to address the requested functionality. Several meetings with the focus groups were held until the final functionality was defined.

The Kiosk is designed with a screen-saver function that will display graphical files (either still pictures or motion files) on a rotating basis. The presentation order of these files is controlled by TxDOT and can be modified by using a GUI available on the Kiosk Master Computer. The intent of the screen saver is to provide a mechanism for advertising so that the ongoing maintenance costs can be subsidized.

Figure 28 shows the main menu or entry screen of the Kiosk Field Unit. From this screen, the user has the choice to select one of the following options:

- Map: A graphical map of San Antonio with real-time traffic data overlayed on the map
- Weather: Current and forecast weather information
- Airport: Information about the San Antonio International Airport
- Transit: A presentation of transit information for the San Antonio metropolitan area
- Volume: Adjust the sound level of the Kiosk Field Unit
- Help: Receive help on how to use the Kiosk Field Unit

Figure 29 shows the graphical map with real-time traffic conditions overlayed on the map. The data for the graphical map are derived from a Navigation Technologies database. Map display tools from ESRI are used to render the display. The user has the following options:

- Pan the map
- Zoom the map
- Reset the map to full view
- Find a specific location
- Receive turn-by-turn instructions to a specified location
- Print the map
- View various categories of "points of interest" from the navigation database

Figure 30 shows the transit interface screen of the Kiosk Field Unit. The transit information is electronically transferred from a transit server to the MDI Data Server. The Kiosk Master Computer then downloads this information to each Kiosk

Figure 28. Kiosk Field Unit Entry Screen

Figure 29. Kiosk Field Unit San Antonio Graphical Map

Field Unit. From this screen, the user has the following options:

- View the bus routes throughout San Antonio
- View a route associated with a bus stop
- View route maps
- View current fare information
- View general transit information
- Print the map and bus schedules

Figure 31 shows the weather interface screen of the Kiosk Field Unit. The information for the weather interface is provided, under contract, by a local San Antonio meteorologist. From this screen, the user has the following options:

- View the current radar image for most of Texas
- View the five-day weather forecast
- View the current weather conditions
- Print the information

Figure 32 shows the airport interface screen of the Kiosk Field Unit. The data for the airport screens are maintained on GUIs executed on the Kiosk Master Computer. From this screen, the user has the following options:

- View a map of the San Antonio International Airport
- View airline contact information
- View rental-car contact information
- View airport parking information
- Print the information

It is envisioned that the San Antonio International Airport will have electronic connectivity among the airlines and rental car agencies. After this information is available electronically, the electronic data will probably be integrated into the Kiosk Field Unit.

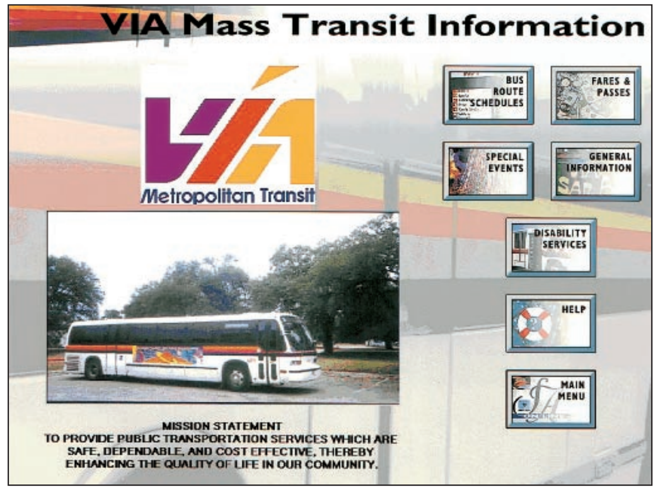

Figure 30. Kiosk Field Unit Transit GUI

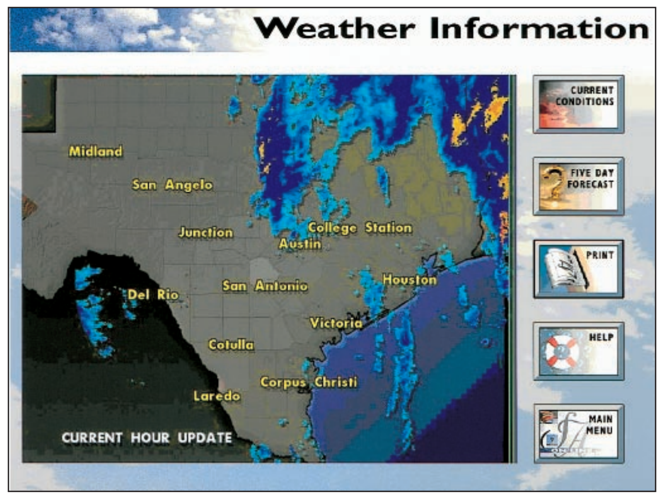

Figure 31. Kiosk Field Unit Weather GUI

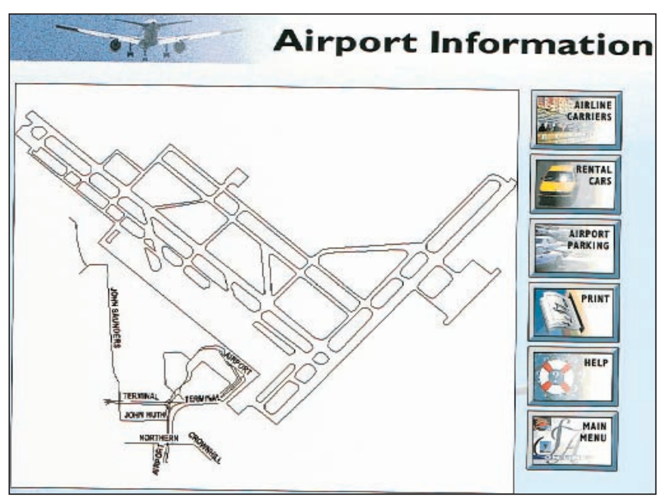

Figure 32. Kiosk Field Unit Airport GUI

6.3 Tradeoff Decisions

During the design phase of the Kiosk program, a number of tradeoffs were made. These tradeoffs included the type of communication used to communicate data to the Kiosks as well as the type of printer installed in the Kiosk Field Unit. The tradeoff data are provided in Tables 8 and 9.

6.4 Summary

The Kiosk project successfully demonstrated the distribution of the ATIS throughout the San

Table 8. Kiosk Printer Tradeoff Decisions
(Selected printer is highlighted in yellow.)

Characteristic	Thermal Printer	LaserJet Printer
Environmental Adaptability	Rolled paper is not sensitive to jamming.	Humidity can cause paper jamming.
Other Kiosk Deployments	Used extensively by the supplier of the Kiosk.	Not widely used due to jamming and maintenance issues.
Paper Capacity	Utilizes large continuous rolls of paper. Using variable length printouts can control excess paper usage.	Requires additional paper tray (and larger footprint) to support more than 500 sheet capacity.
Form Factor	Thermal printers require a small footprint (no printer enclosure is required).	Large foot print required which increases the size of the Kiosk.

Table 9. Kiosk Communications Tradeoff Decisions
(Selected Communications are highlighted in yellow.)

Characteristic	ISDN B-Channel	ISDN D-Channel	FM STIC
Bandwidth	56 Kbaud	9.6 Kbaud	7.6 Kbaud
Initial Cost	High, requires expensive ISDN equipment.	High, requires expensive ISDN equipment and ISDN pad equipment.	Medium, a single FM STIC receiver is required.
Monthly	High.	High (due to tariffs).	Low, no monthly costs (costs are included in the IVN program.)
Flexibility	Low, requires ISDN line.	Low, requires ISDN line.	High, only access requirement is an FM signal of appropriate strength.

Antonio metropolitan area. The user interface for the Kiosk was designed to be intuitive and easy to navigate. The ATIS System has been widely used when installed in new locations. A long-term analysis of the usage statistics will determine if the usage rates remain high.

Implementation costs were streamlined by using the same data stream (i.e., FM STIC) as the In-Vehicle Navigation program. This communications media provides a robust conduit of information at minimal cost (and new sites can be added with no additional communications cost). Because the system is based on a regularly maintained navigation database, the system will be periodically updated to assure that the route guidance directions supplied are accurate.