



Dual-Mode GPS Application

Tech Note – TN1003

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Introduction

Ctek's Dual-Mode GPS application is a general purpose GPS application that can be installed on any Ctek SkyRouter. When installed the application is administered from SkyRouter's Application environment using a web browser. The Dual-Mode GPS application operates with the internal GPS capabilities of the M and Z Series models 4200 and 4400 as well as an external GPS unit on all SkyRouters.

The Dual-Mode GPS application takes its name from its ability to simultaneously update a AVL server application and a client application such as Microsoft's Streets and Trips or DeLorme. Figure 1 shows the architecture of a Z4200 using the full set of capabilities available in the Dual-Mode GPS application.

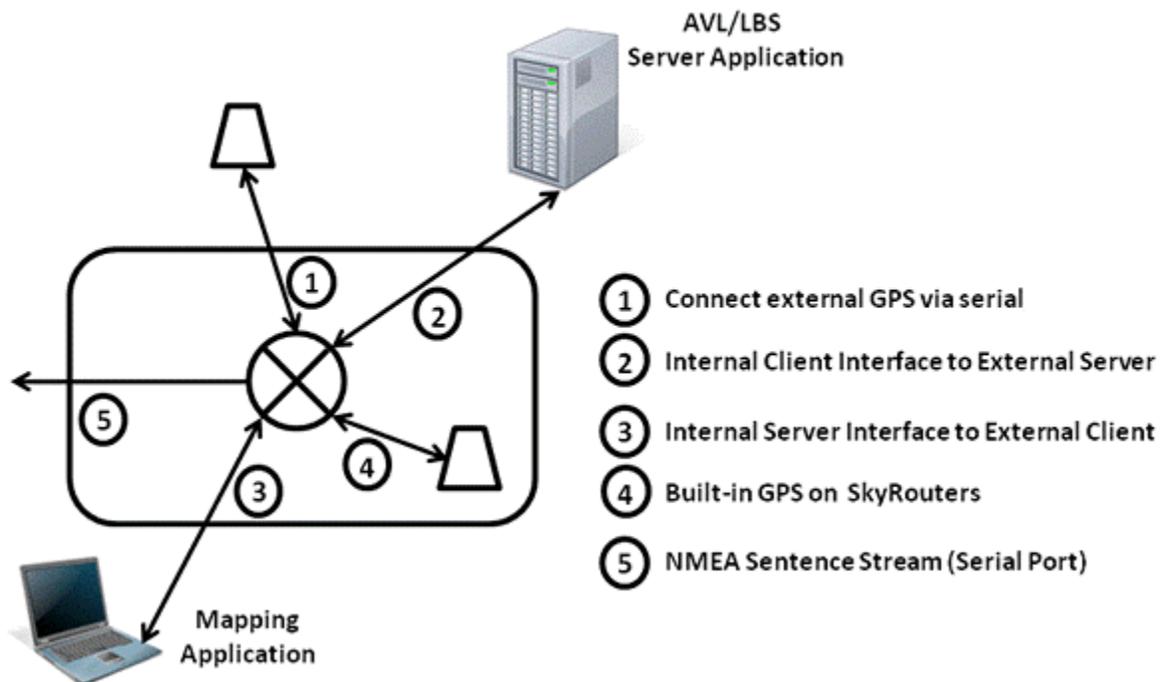


Figure 1

In Figure 1 the external communications interfaces are numbered 1 – 4. A brief description of each interface follows:

1. **External GPS Interface** – An external GPS unit may be connected to the SkyRouter resident Dual-Mode GPS application using the serial application (RS-232). The reference GPS unit for this interface is the Garmin model 18 OEM unit. Ctek can offer integration services for any selected GPS module that produces NMEA sentences.
2. **Internal Client To External Server Interface** – The transport for this interface is either UDP/IP or TCP over the wireless IP data connection provided by the SkyRouter. The Dual-Mode application maps raw GPS information onto the proprietary interfaces of the configured interface. The AVL applications currently implemented are described in detail in this document. Integration with other AVL like applications can easily be accommodated.
3. **Internal Server to External Client Interface** – This interface provides a pass through of the NMEA sentence information read from either the internal or external GPS. Through the application administration screen two transports are available for this connection; either TCP/IP on the WAN (wireless) or TCP/IP through the LAN. To use the TCP/IP transport on a laptop application a port redirector utility may be required.
4. **Internal GPS Interface** – This programmatic interface connects to the internal GPS resources SkyRouter. The selection of either an external GPS or the internal GPS resources is made through the application administration screen.

Note – The internal GPS capability of the M and Z Series models 4200, 4400, and 4550 does not depend on the wireless network (A-GPS) for positioning although network connectivity is required to transmit to remote server based AVL applications.

5. **NMEA Sentence Stream** - Based on selections made on the Unit Configuration screen all NMEA sentences produced by the selected GPS unit can be streamed to the auxiliary serial port, the DB9 RS232 port, or not at all. Sentences are output every five seconds.

Dual-Mode GPS Application Administration

When installed the Dual-Mode GPS application is found under the Applications category on a SkyRouter. Selecting Navigation Services brings up the top level screen shown in figure 2 which combines a GPS dashboard with navigation to detailed setup screens for various server and client interfaces.

From the router home page click on Applications and then Navigation Services to get to the GPS configuration page.

Navigation Services

<i>GPS Status and Data</i>			
COURSE(True):	SPEED(Mph): 0.0	LAT:	LON:
STATUS: WARNING	FIX TYPE: None	SATS:	

Unit Configuration:	Select
External Servers:	Select
Internal Servers:	Select

Refresh Back

Figure 2

Selecting the Unit Configuration option brings up the screen shown in Fig 3 which allows the user to make key configuration decisions about the overall application.

Unit Configuration

Navigation Services

Unit Configuration

GPS Device:	<input checked="" type="radio"/> Internal	<input type="radio"/> External On RS-232
Stream NMEA Data:	<input checked="" type="radio"/> No	<input type="radio"/> To RS-232
Speed/Distance Units:	<input checked="" type="radio"/> Miles	<input type="radio"/> Kilometers
External Mapping Server:	Generic TAIP ▼	

Figure 3

GPS Device: - Allows the user to select the source of GPS information. Choices are the internal GPS or the external RS232 (DB9) port.

Stream NMEA Data: - Selects where the NMEA data stream will be sent. This interface outputs all unformatted NMEA produced by the selected GPS unit every five (5) seconds. Choices are None or the RS232 (DB9) port.

Speed/Distance Units: - Selects either metric or imperial values for distance (kilometers vs. miles) and speed (km/hour vs. miles/hour). All display screen labels will be updated to reflect this choice.

External Mapping Server: - Selects an interface to be used with an external mapping, AVL, or LBS server application. Choices are No Server, DataGate NMEA, Procon NMEA, Vistracks, or Generic TAIP. This selection will alter the characteristics of the External Servers screen selected from the top level menu.

External Server Configurations

DataGate Server

Selecting the DataGate Server option on the unit configuration screen will cause the External Server button to bring up the screen shown in Figure 4.

Navigation Services

The screenshot shows a configuration window titled "DataGate NMEA Mapping Server". It contains the following fields and controls:

- Server Address: [Text Input Field]
- Server Port: [Text Input Field]
- Update rate(Sec): [Text Input Field] with value 0
- Update distance(mi): [Text Input Field] with value 0.0
- Device ID: [Text Input Field]
- Server ACK: Radio buttons for No (selected) and Yes
- Update [Button]
- Back [Button]

Figure 4

Server Address: - Used to configure the IP address of the AVL/LBS server.

Server Port: - Used to configure the IP port number used by the AVL/LBS server.

Update Rate: - Used to specify in seconds how often the AVL/LBS server will be updated. A zero value indicates that periodic updates should not be sent.

Update distance: - Used to specify in miles or kilometers the amount of movement that will cause an update to be sent to the AVL/LBS server. A zero value indicates that movement should not be considered in issuing server updates. This setting is independent of the Update Rate setting.

Device ID: - A name or token by which the tracked device will be known on the server application

Server ACK: - Determines whether or not the server application will issue an ACK or NAK in response to an update sent from the tracked unit.

Procon NMEA Server

Selecting the Procon Server option on the unit configuration screen will cause the External Server button to bring up the screen shown in Figure 5.

Navigation Services

The screenshot shows a configuration window titled "Procon NMEA Mapping Server". It contains three input fields: "Server Address" (a wide text box), "Device ID" (a shorter text box), and "Server Port" (a small numeric text box). Below these fields are two buttons: "Update" and "Back".

Figure 5

Server Address: - Used to configure the IP address of the AVL/LBS server.

Server Port: - Used to configure the IP port number used by the AVL/LBS server.

Device ID: - A name or token by which the tracked device will be known on the server application

Vistracks Server

Selecting the Vistracks Server option on the unit configuration screen will cause the External Server button to bring up the screen shown in Figure 6.

Navigation Services

<i>Vistracks.Mapping Server</i>			
Server Address:	<input type="text"/>	Server Port:	<input type="text"/>
Device ID:	<input type="text"/>	Update rate(Sec):	<input type="text" value="0"/>

Figure 6

Server Address: - Used to configure the IP address of the AVL/LBS server.

Server Port: - Used to configure the IP port number used by the AVL/LBS server.

Device ID: - A name or token by which the tracked device will be known on the server application

Update Rate: - Used to specify in seconds how often the AVL/LBS server will be updated. A zero value indicates that periodic updates should not be sent.

Generic TAIP Server:

Selecting the Generic TAIP Server option on the unit configuration screen will cause the External Server button to bring up the screen shown in Figure 7.

Navigation Services

Generic TAIP Mapping Server					
Server 1:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 2:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 3:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 4:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 5:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 6:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 7:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>
Server 8:	Address: <input type="text"/>	Port: <input type="text"/>	Device ID: <input type="text"/>	Enable: <input type="checkbox"/>	Rate(Sec): <input type="text" value="0"/> Distance(M): <input type="text" value="0.00"/>

Figure 6

The Generic TAIP Server configuration supports up to 8 servers which will be independently updated based on the rules configured in this screens.

Server Address: - Used to configure the IP address of the AVL/LBS server.

Server Port: - Used to configure the IP port number used by the AVL/LBS server.

Device ID: - A name or token by which the tracked device will be known on the server application

Enable: - Check this box to turn the selection on

Update Rate: - Used to specify in seconds how often the AVL/LBS server will be updated. A zero value indicates that periodic updates should not be sent.

Update distance: - Used to specify in miles or kilometers the amount of movement that will cause an update to be sent to the AVL/LBS server. A zero value indicates that movement should not be considered in issuing server updates. This setting is independent of the Update Rate setting.

Internal Servers Configuration

The Dual-mode GPS Internal Server feature sends at five second intervals a standard NMEA GPRMC sentence over TCP/IP to a client application such as Streets and Trips, Delorme, etc. In this case the Dual-mode application acts as if it were a simple GPS device. The Internal Server is capable of transmitting to local (LAN) connections and to remote (WAN) connections over the air simultaneously. Also, Internal Server updates and External Server updates can be transmitted simultaneously.

Selecting the Internal Servers option on the top level menu screen will cause the Internal Server screen shown in Figure 8 to be displayed.

Navigation Services

Internal TCP Server Configuration

Listen For TCP WAN Connection:	<input checked="" type="radio"/> No <input type="radio"/> Yes	Listen For TCP LAN Connection:	<input checked="" type="radio"/> No <input type="radio"/> Yes
WAN Listen Port:	<input type="text"/>	LAN Listen Port:	<input type="text"/>
WAN Update rate(Sec):	<input type="text" value="0"/>	LAN Update rate(Sec):	<input type="text" value="0"/>

Figure 8

Listen For TCP WAN/LAN Connection - A yes/no setting that enables the TCP interface when a far end connection is detected.

WAN/LAN Listen Port – The TCP port that will be used by the application

WAN/LAN Update Rate - The frequency at which the application will be updated with new positioning data. Time measured in seconds.