DEPLOYABLE INTELLIGENCE AND TRACKING SYSTEM FOR HOMELAND SECURITY AND SEARCH AND RESCUE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/492,711, filed Jul. 25, 2006, and incorporated herein by reference; This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/429,926, filed on May 8, 2006, and incorporated herein by reference; This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/343,079, filed on Jan. 30, 2006, and incorporated herein by reference; This application is also a Continuation-In-Part of U.S. patent application Ser. No. 11/342,289 filed Jan. 28, 2006 and incorporated herein by reference; This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/209,030, filed on Aug. 22, 2005, and incorporated herein by reference; This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/257,416, filed on Oct. 24, 2005, and incorporated herein by reference; This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/203,823 filed Aug. 15, 2005 and incorporated herein by reference; This application is a Continuation-In-Part of U.S. patent application Ser. No. 11/145,170 filed on Jun. 6, 2005 and incorporated herein by reference; application Ser. No. 11/145,170 is a Continuation-In-Part of U.S. patent application Ser. No. 10/743,042 filed Dec. 23, 2003 and incorporated herein by reference; application Ser. No. 10/743,042 is a Continuation-In-Part of U.S. patent application Ser. No. 10/638,524 filed Aug. 12, 2003 and incorporated herein by reference; application Ser. No. 10/638,524 is a Continuation of U.S. patent application Ser. No. 09/516,215 filed Feb. 29, 2000 and incorporated herein by reference; application Ser. No. 09/516,215 claims is a Non Prov. of Provisional U.S. Patent Application Ser. No. 60/123,170 filed Mar. 5, 1999 and incorporated herein by reference; application Ser. No. 10/743,042 is a Continuation-In-Part of U.S. patent application Ser. No. 10/319,725 filed Dec. 16, 2002 and incorporated herein by reference. Application Ser. No. 10/743,042 is a Non Prov. of Provisional U.S. Patent Application Ser. No. 60/440,618 filed Jan. 17, 2003 and incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention relates to the field of aircraft and ground vehicle tracking and surveillance. In particular, the present invention is directed towards a deployable intelligence and tracking system for homeland security and search and rescue.

BACKGROUND OF THE INVENTION

[0003] Passive Broadband Tracking may include triangulation or multilateration systems using time difference of arrival (TDOA) processing to track aircraft in local, regional and wide areas. These systems generally need pulse transmissions from the aircraft, which have sufficiently fast rise times in order to make a consistent time reference on the signal. Pulse transmission systems, having sufficiently fast rise times are generally higher frequency signals, L-band or above (generally higher than 900 MHz), with sufficient bandwidth to provide the fast rise time needed for passive broadband tracking. Signals with sufficient frequency and bandwidth include secondary surveillance radar systems (SSR), including Mode A, Mode C, Mode S, and ADS-B.

[0004] Companies fielding triangulation and/or multilateration systems for SSR include Sensis Corporation (www.sensis.com), ERA (www.era.cz) and Rannoch Corporation (www.rannoch.com), the respective websites thereof all of which are incorporated herein by reference.

[0005] While SSR signals are used for multilateration on the 1090 MHz frequency, there are others that use TDOA processing of other aircraft signals on different frequencies. One of these is the VERA-E system manufactured by ERA a.s., of the Czech Republic, as illustrated in FIGS. **1-3** and **5**, taken from the website www.omnipol.cz, incorporated herein by reference. FIG. **1** illustrates a portable VERA-E passive sensor as set up in the field. FIG. **2** is a cutaway view of the VERA-E sensor, illustrating multiple antennas. FIG. **3** illustrates a VERA-E sensor as set up in the field, concealed by camouflage.

[0006] The VERA-E system may be used to track aircraft over wide areas using broadband methods. Essentially the broadband aspect is achieved by using a series of antennas and receiver systems interconnected as illustrated in FIG. **5**. Each sub system handles a subset of frequencies in an overall range that includes from below 1 GHz to over 20 GHz.

[0007] A typical output from the VERA-E system is as follows:

[0008] Real time display

[0009] 1-5 seconds update rate

[0010] Target/track ID

[0011] Coordinates x, y, (and z for 3D system)

[0012] Radar signal parameters (PRI, PW, CF, . . .) and radar type/operation modes

[0013] SIF/IFF (3/A, C, 1, 2) modes

[0014] Barometric altitude (100 feet resolution) derived from Mode C reply

[0015] Mode S address (24 bits) and altitude from Mode S (25 feet resolution)

[0016] Mode 4 (IFF) flag

[0017] TACAN/DME channel/frequency and mode (X,Y)

[0018] GPS time

[0019] Aircraft systems that can be tracked using this type of system include Joint Tactical Information Distribution System (JTIDS) and Distance Measuring Equipment (DME). A good description of JTIDS is found at http://en.wikipedia.org/wiki/JTIDS. incorporated herein by reference. The JTIDS system is an L-band TDMA network radio system used by the United States armed forces and their allies to support data communications needs, principally in the air and missile defense community. It provides high-jam-resistance, high-speed, crypto-secure computer-to-computer connectivity in support of every type of military platform from Air Force fighters to Navy submarines.

[0020] JTIDS is one of the family of radio equipment implementing Link 16, which is a highly-survivable radio communications design to meet the most stringent requirements of modern combat. Link 16 equipment has proven, in detailed field demonstrations as well as in the AWACS and JSTARS deployment in Desert Storm, the capability of basic Link 16 to exchange user data at 115 kilobit/s, error-correction-coded. (Compare this to typical tactical systems at 16 kilobit/s, which also have to accommodate overheads in excess of 50% to supply the same transmission reliability.) While principally a data network, Link 16 radios can provide