**Product Data Sheet: Woofnet Collar and Accessories**

Woofnet collar is a waterproof package that houses a Dog Interface Unit(DIU) and optional accessories (Blue tooth RF extender, IWoof Smart Phone, Batteries) to enable a well equipped dog to interact with WolfGIS smart phone applications.

Woofnet DIU

A Bluetooth companion device that responds to Woofnet control commands to establish and maintain control of a dog, either in the field, yard or work setting. The DIU includes a microprocessor, Bluetooth interface, custom electronics and peripheral devices that enable both human (on/off switch) and dog/human interaction(audio, vibrator, and shock probes). The DIU receives incoming commands via blue tooth and resets/configures the collars duty cycle/alert sequence. Absence of expected BlueTooth positive control commands initiates the configured alert sequence.

**Master Device Smart Phone configuration:**

The DIU is dormant (incapable of initiating an alert sequence) until configured via Bluetooth for interaction with a smart phone. Once the controlling smart phone (phone number) has been configured as the master device for the DIU... the DIU will only respond to commands received from its master device smart phone. A configuration sequence will allow the reset of the phone number for the master device smart phone. This mechanism allows the DIU to be slaved to multiple smart phones, but only 1 at a time.

**Alert sequence configuration:**

Audio tones shall include single continuous tone or repetitive beep with a configurable audio level 1.10 and duration (1..10 seconds). Vibration shall be configurable with control of vibration strength 1.10 and duration 1.10. Shock is configurable with control of output power 1.10 and duration 1.10. On/off control of each type of signal is configurable. The default configuration is: Audio(7,7), Vibration(7,7), Shock(7,7) ...[0,0] is equivalent to off .

(Re)Configuration is achieved via WolfGIS Virtual Leash or Boundary Enforcement Application Software. These applications shall be able to run onboard diagnostics for the DIU including: self test, read configured values and diagnostics to reset/configure commands to modify the behavior of the DIU. The default duty cycle for receipt of positive control commands is .5 Hz.

A self test button enables the user to verify operational configuration. A press of the button results in the (configured) alert sequence being executed as though a boundary violation had occurred. Power on will not initiate an alert sequence, until the self test button is depressed

Once the DIU has started the alert sequence it will complete the sequence unless reset by a positive control command, or by depressing the power on/off switch.

After completing the alert sequence, the DIU must be reset manually or by receipt of positive control commands from a controlling smart phone. Manual reset is accomplished by pressing the on/off switch.

**Positive control commands:**

Positive control commands are generated normally at .5 to 10Hz by a WolfGIS smart phone application and are communicated via Blue Tooth. Each positive control command communicates two pieces of information 1) positive control heart beat... 2) expected positive control duty cycle.

The cycle rate defaults to .5Hz on power up. The Woofnet DIU is continuously monitoring the Bluetooth interface for positive control commands received from its master device(smart phone). Absence of a positive control command for more than the expected elapsed time period (duty cycle) initiates an alert sequence. Receipt of a positive control command resets the alert sequence. The normal duty cycle rate can be reduced during periods of inactivity with respect to motion, to conserve battery power. This will be configured by a positive control command with a low(0) expected duty cycle. Resumption of normal duty cycle rate will be in response to a positive control command indicating an increased duty cycle.

**IWoof Smart Phone: Android 2.2**

Small form factor miniature smart phone, fully functional voice, text messaging, wireless 2G/3G. This phone can be worn by the dog to host WolfGIS applications including boundary containment and virtual leash. Boundary containment requires downloading of the bounding polygons from either a master phone or the internet. Once downloaded, the boundary definition files (KML) are stored in the smart phone for usage by the WolfGIS Boundary Containment Application.

**WolfGIS Boundary Containment Application Software Interface:**

WolfGIS Boundary Containment software interacts with the DIU by issuing positive control commands to the DIU via Bluetooth. Boundary containment software uses proprietary WolfGIS position estimation algorithms to determine the relative position of the smart phone to the bounding polygons. If the bounding polygon is violated by the position estimate; the positive control command generation is halted. When the position estimate is restored within the bounding polygons, the positive control command generation resumes. Whenever the boundary containment software detects a boundary violation condition has existed for more than 5 minutes, the software will attempt to send a boundary violation and position update message to the WolfGIS alert URL.

Positive control commands are normally generated at .5 to 10Hz by a WolfGIS smart phone application and are communicated via Blue Tooth. Each positive control command communicates two pieces of information 1) positive control heart beat... 2) expected positive control duty cycle.

Generation of a positive control command resets the alert sequence. The normal duty cycle rate can be reduced during periods of inactivity with respect to motion, to conserve battery power. This will be configured by generating a positive control command with a low expected duty cycle. Resumption of normal duty cycle rate will be in response to a positive control command with and increased duty cycle. Dormancy / inactivity can be set by sending a duty cycle of 0. The smart phone accelerometer is monitored to detect motion and set the duty cycle parameter based on detected motion(.5 .. 10Hz).

**Virtual Leash Software Interface:**

Virtual Leash interacts with the DIU by simply generating a positive control command at 2 Hz. Whenever blue tooth connectivity is lost.. the DIU initiates an alert sequence.

**BlueTooth Interface:**

Is integral to the DIU and the IWoof .. 10 meters effective range

**Woofnet RF Extender:**

The RF Extender is a custom Blue tooth to RF adaptor that extends the range of the Bluetooth network up to 1Kilometer Line of site RF/SPI .

**Additional Batteries:**

Standard rechargeable batteries (TDB) can be inserted into the Woofnet Collar to power the DIU and other accessories.

The IWoof uses its own self contained battery and power management system.