Str. Observatorlui 146/36
Cluj-Napoca 400352, Romania (EU
Tel: +40-(0)741-03333
Fax:+40-(0)264-59198
E-Mail: sales@gps4net.com
Http: www.gps4net.com

G4NISMP – Brief description

Notes:

Nr.	Author:	Data:	Comments:
1.	Chende Florian	28 August 2007	Document creation
2.	Popovici Dan	30 August 2007	Review
3.			

1. Introduction

This document describes the internal architecture of the G4NISMP protocol. The G4NISMP is a radio protocol designed to work on 2,4GHz ISM Band to carry non-critical data between transmission/receiving nodes, in automotive environment.

The scope of this protocol is to carry non-critical data between nodes responsible with functions not connected with the car's safety, braking system, transmission, etc. The data can be for example: GPS navigation data, environmental information, data extracted from the car's internal bus (CAN, OBD, etc.), or data exchange between different cars using such nodes disposed in a certain replication structure.

Service and firmware reprogramming of the nodes are possible, thus eliminating the need for a physical connection between the serviced node and the service equipment.

2. Architecture description

The protocol is built around the nRF2401 radio transceiver supplied by Nordic Semiconductors. It is usable on any design which includes this transceiver.

The G4NISMP is a multimaster protocol. It uses an address system which allows the radio packet to travel from the transmitter to the intended receiver without disturbing the nodes which are not the desired destination.
The data is sent in packets of 256 bits, with a speed of 1Mbps, using the channel 0 of the nRF2401 (2400 MHz).

The packet contains the routing information (addresses) and the data frame. The data frame is the payload of the packet. Each node has a list of independent custom commands. The data frame instructs the receiving node regarding which command should be executed, and which parameters.

The protocol has an implemented method designed to discover the devices present in the range of a certain node, thus facilitating cases where the number of the nodes is modified dynamicaly.

In case a node needs to transmit data, the transmitter sends to the intended receiver one packet of data, and the receiver must confirm the success of the operation by replying another packet with the confirmation code of the transaction. However if the confirmation is not received by the original transmitter, then the transaction is repeated.

Each packet contains protocol related information (routing addresses and CRC) and the data frame. The CRC is a 16 bit sum used to verify the correct reception of the packet. The routing addresses are used to ensure the correct path of the radio packet. Certain routing addresses are reserved and used by the discovery procedure. The data frame is 21 bytes long, splited as : 1 byte the command code, 4 bytes the command parameters and another 16 bytes the custom data associated with the command. Thus, up to 256 diffrent commands can be implemented on very single node, each one with its own parameters.

The G4NISMP is a versatile protocol which allows a whole range of applications to be implemented on the automotive environment. Some relevant examples are listed below:

- CAN information transmission from a node connected to the car's bus to a device which stores the data.
- Vehicle ignition control performed by a Driver identification code sent from a remote control to a storage device.
- A logger device which record several states of a truck and later transmit the data to a collector once the truck is returned in the parking place.
- The protocol can stream voice between a mobile node (ex. Handset) and a rely device in the car which bridges between G4NISMP and GSM network.
- A node equipped with a GPS receiver can rely navigation data to a display.
- Each node can be programmed with settings and if neccessary serviced remotely, without the need to uninstall the device.