TransPOD™

ITS Broadband Applications

TransPOD™ is a feature-rich intersection priority control system. On-street physical detection is not required.

A TransPOD™-equipped vehicle (with the aid of its highly accurate positioning system) knows its dynamic location and the locations of upstream intersections. When the vehicle crosses a pre-determined geographic boundary it routes a priority request message via a broadband wireless mesh network to the upcoming intersection. This event is logged as a check-in. The priority request message can indicate high priority in the event that the vehicle is an emergency vehicle or low priority message if the vehicle is a transit vehicle.

When the TransPOD™-equipped vehicle enters the intersection it routes a priority clear message to the intersection. This event is logged as a checkout. Both events are logged locally and remotely in real time.

TransPOD™ is portable across multiple wireless architectures including 3G – 4G Networks, HSDPA and EVDO allowing unparalleled flexibility.

TransPOD™ TSP . . . and beyond.

GreenLight by NOVAX

Priority Request Server (PRS)

The PRS is the TransPOD™ system's intersection resident device encompassing an embedded computer and broadband radio. The PRS is hard wired to the intersection's traffic signal controller. The PRS receives the request(s) for priority from one or more approaching PRG equipped vehicles, adjudicates between multiple requests of differing priority and sends the appropriate service request to the traffic signal controller.

Novax Elements Management System (NEMS™)

NEMS™ is a remote configuration and management tool for the TransPOD™ system. It is not required for TransPOD™ operation. NEMS™ is connected to the wireless network on the street via the Internet, Intranet or private network.

- Real time AVL.
- Real time remote logging (mirrors individual vehicle and intersection logs).
- Remote configuration of vehicles and intersections.
- Remote software updates.
- Logged data can be sorted and downloaded for reporting.

Wireless Network

The wireless network is the shared machine-to-machine communication medium utilized by TransPOD™ components. A number of current and future technologies can be used to create the wireless network. This example is based on the 802.11 family of WiFi wireless communication technology.

TransPOD™ is portable across multiple wireless architectures including 3G – 4G Networks, HSDPA and EVDO allowing unparalleled flexibility.

InfoPOD™

An optional smart bus stop. It displays the estimated time of arrival of the next TransPOD™-equipped bus or buses, dynamic position of each bus on a map, messages unique to waiting passengers as well as infotainment such as news highlights and advertising.

Priority Request Generator (PRG)

The PRG is the TransPOD™ system's vehicle resident device encompassing an embedded computer, a broadband radio an accurate positioning system aware of its position to within two meters in normal operation.

Optional functionality includes:

- Real time onboard data logging.
- Onboard software can be remotely updated.
- Operating parameters can be reconfigured remotely.
- Over 200 priority levels can be adjusted remotely.
- Conditional priority.

Novax Communications Elements Management Server (CEMS)

CEMS is a remote configuration and management tool for the wireless network. The CEMS is not required for wireless network operation. CEMS is connected to the wireless network via the Internet, intranet or private network.

Portable Wireless Connectivity

- Any IP Device in Wireless Network
- CEMS/NEMS accessible
- Public/Private Network Access

Priority Request Generator (PRG)

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TransPOD

Is a complete priority control and management system. TransPOD (Transit Priority on Demand) and eMVeePOD (Emergency Vehicle Priority on Demand), TransPOD's complementary emergency pre-emption solution, can deliver a total priority control system that can differentiate agencies and vehicles and provide over 200 different levels of priority. The systems are also compatible with legacy systems.

Novax Elements Management System (NEMS)

The NEMS is a server/software package that facilitates remote logging, equipment configuration and performance management of vehicle and signalized intersection components of the TransPOD system. The NEMS is connected to the wireless mesh network through wired or wireless backhaul connections directly or through a VPN tunnel.

- Operating System:Linux
- User Interface: MS Windows

Priority Request Generator (PRG)

- Vehicle Resident Hardware: The PRG is an embedded computer that requests priority (checks in) as the vehicle approaches a signalized intersection and indicates that priority is no longer required when entering the signalized intersection (checks out). The PRG offers considerable flexibility as it can interface with AVL or other onboard systems and sensors; overlapping check-ins and provide priority by direction or time of day.
- Operating System: Linux Gentoo
- Operating Temperature Range: -40ºC to 60ºC
- Power Requirement 12 – 28 VDC
- Power consumption: 7 Watts
- Vibration: J1455

Position Determination System (PDS)

Vehicle Resident Hardware: The PDS combines GPS with 'dead reckoning' technology to provide highly accurate dynamic positioning information to the PRG.

- Operating Temperature Range: -40ºC to 60ºC
- Power Requirement: 12 VDC POE from the PRG
- Power Consumption: 125mA nominal at 12 VDC
- Vibration: J1455

Mobile Mesh Network Router

Vehicle Resident Hardware: A broadband communications device that 'networks' moving vehicles with a fixed mesh network. For priority the mobile mesh router provides low latency communications. The mobile mesh router has considerable bandwidth resources for low latency telemetry and other uses such as on-demand full motion emergency video from a moving vehicle.

- Operating temperature range: -40°C to 70°C
- Power input: 10 to 32 VDC
- Power consumption: 8W typical
- Shock & vibration: MIL-STD-202E, Method 204C

Priority Request Server (PRS)

Intersection Resident Hardware:
An embedded computer that interfaces with traffic signal controllers at signalized intersections. Provides whatever traffic signal controller input is required; typically a closed contact or 6.25 Hz pulsed signal. Lightning suppression in keeping with NEMA standards (opto isolated from other wayside equipment).

- Operating System: Linux Gentoo
- Operating Temperature Range: -40ºC to 60ºC
- Power Requirement:
- 12 or 24 VDC POE from the outdoor mesh network router or
- 95-135VAC for stand-alone power supply located within the Traffic Signal Controller Cabinet or other cabinet with available power.
- Power Consumption:7 Watts
- Vibration: ANSI C136.31-2001
- Other: NEMA TS2-3003 v02.06

Outdoor Mesh Network Router (Node)

Intersection Resident Hardware: The outdoor mesh network router is the wayside communication device that establishes a fixed wireless network to 'network' vehicles and signalized intersections. The fixed mesh network router has considerable bandwidth resources for other communication such as intersection video and other authorized devices without impacting the performance of the priority system. Based on the size of the mesh network and bandwidth requirements one or more outdoor mesh network routers will be configured as gateways to connect the mesh network to a backhaul network, to NEMS and an operations management center.

- Operating Temperature Range: -40ºC to 55ºC
- Backup Power: 1 to 4 hours (variability based on ambient temperature and throughput requirements)
- Power Requirement: 90 – 480VAC
- Power Consumption: 23 Watts typical
- Shock & vibration: ETSI 300-19-2-4 spec T41.E class 4M3

Backhaul Network

A wireless mesh network requires a connection or number of connections to a backbone communication network to facilitate communication from within the network to outside of the network. Backhaul circuits may be provisioned with copper wire, fiber optics, or wireless facilities and must be capable of supporting an IP based connection preferably using an Ethernet interface and transmission layer. The determination of backhaul requirements is dependent on throughput and infrastructure requirements as determined by an RF study and the network engineering process.

System Security

The wireless mesh network and its components are WPA2/802.11i capable. Connectivity via the Internet from the wireless network to the NEMS use IPSec routers at both the network and the NEMS gateway. Communications take place via a secure tunnel inside the Internet. User access to the NEMS and the active PRG and PRS components is controlled using multi level access control providing view only to full configuration control of the system.

GreenLight by NOVAX

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