

Access Point Controller Card (APCC)

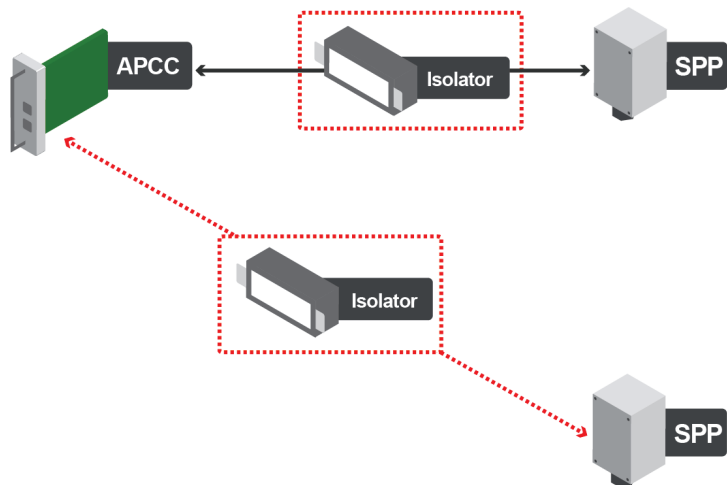
The Sensys Networks Access Point Controller Card (APCC) is a second generation controller card that maintains low power consumption, supports multiple radios, and allows for additional communication and processing power. The APCC, which is compatible with all of Sensys Networks VDS240 Wireless Vehicle Detection System products, receives and processes data from the sensors. The APCC then relays the sensor detection data to a roadside traffic controller or remote server traffic management system.

SPP Radio

The SPP is a low powered radio that maintains two-way wireless links to an installation's sensors and repeaters. The SPP establishes overall time synchronization, transmits configuration commands and message acknowledgements, and receives and processes data from the sensors. The SPP then uses wireless connections to relay the sensor detection data to the APCC.

Isolator

An isolator isolates and routes power from the APCC to the SPP and provides up to 2000 cable feet of communication for the APCC to and from the SPP at RS422 capabilities.



The minimum APCC system consists of an APCC, one SPP radio, and a isolator. The system can also consist of two SPP radios with an isolator for each SPP radio that offers electrical isolation up to 1500V, surge protection up to 1500V, and AC power cross protection.

Types of APCC configurations

The APCC single-slot configuration consists of dual SPP radio ports, Sensys Networks expansion (EX) port, and contact closure interface via backplane to a traffic controller. It also has dual USB 2.0 full speed host ports and 10/100Base-T network access. The APCC dual-slot configuration adds an SD memory card, real-time battery-backed clock, optional dual serial (DB9) interface*, and an optional second serial port or built in cellular modem.

* Full handshake control - COMM1 only



Functions / Features

Sensys Networks radio communications

- To/from Sensys Networks sensors
- To/from Sensys Networks repeaters

Relay of sensor data

- Via contact closure signals to traffic controller
- Via IP connectivity (wired or wireless) to traffic management systems, upstream servers, etc.
- Integrated cellular data modem (optional)

Processing of sensor data

- Per-lane or per-vehicle data
- Data binning over selectable time intervals
- Data filtering (e.g., adaptive holdover)

Storage of sensor data

- Data buffering (event caching) 500 K
- Data storage (processed data) 1 M
- MMC/HCS D retractable memory (optional)

Master timebase for all supported wireless sensors

- Common clock for sensor timestamps
- Can be synchronized to NIST timing signals

Radio signal quality measurements

- Receive Signal Strength Indicator (RSSI, in dBm)
- Link Quality Index (LQI, figure of merit)

Firmware upgrades

- Can be upgraded via IP connectivity or via local PC connection
- Can deliver upgrades to all other Sensys Networks devices

Simple installation

- Any roadside location that provides adequate signal coverage to sensors/repeaters
- No special requirements regarding setback, relative angle of the sun, or mounting stability

Low power consumption

No calibration or adjustment required

Functional Specifications

| | |
|------------------------------------|---|
| interfaces | <ul style="list-style-type: none"> communicates with traffic controller via 2x22 pin edge connector to backplane (2) RS-422 full duplex to SPP radio(s) via RJ45 connector (2) USB 2.0 full speed RS-485 full duplex to EX cards via RJ45 connector 10/100Base-T network access via RJ45 connector to/from configuration device (PC) via TCP/IP over 10/100Base-T Ethernet to/from central network management / data collection facilities via TCP/IP <ul style="list-style-type: none"> – 10 /100Base-T Ethernet – cellular data modem |
| IP connectivity | <ul style="list-style-type: none"> HTTP, PPP, PPTP, SSH, optional encryption over tunnel 10/100Base-T via RJ45 connector GSM GPRS connectivity (optional) <ul style="list-style-type: none"> – dual-band 850/1900 MHz GSM (N. American version) – dual-band 900/1800 MHz GSM (int'l version) – up to 85.6 kbps CDMA2000 1xRTT connectivity (optional) <ul style="list-style-type: none"> – dual-band 800/1900 MHz CDMA – (per specific cellular service provider) – up to 153.6 kbps |
| per-lane data processing | <ul style="list-style-type: none"> counts (volume) occupancy average and median speeds binned speeds and vehicle lengths over selectable time intervals |
| per-vehicle data processing | <ul style="list-style-type: none"> initial vehicle detect time gap speed length |
| memory processor | <ul style="list-style-type: none"> 400 MHz ARM9 processor Linux 2.6 operating system 1 GB Flash 64 MB RAM |
| over-the-air protocol | Sensys Networks NanoPower (SNP) protocol (TDMA) |
| physical layer protocol | IEEE 802.15.4 PHY |
| modulation | Direct Sequence Spread Spectrum Offset Quadrature Phase-Shift Keying (DSSS O-QPSK) |
| transmit/receive bit rate | 250 kbps |
| frequency band | 2400 to 2483.5 MHz (ISM unlicensed band) |

| | |
|-------------------------------------|---|
| frequency channels | Up to 16 |
| channel bandwidth | Up to 2 MHz |
| antenna type | microstrip patch antenna (behind front face panel) |
| antenna field of view | ±60° (azimuth & elevation) |
| nominal output power | 0 dBm |
| spurious emissions | <ul style="list-style-type: none"> 30 - 1000 MHz: < -36 dBm 1 - 12.75 GHz: < -30 dBm 1.8 - 1.9 GHz: < -44 dBm 5.15 - 5.3 GHz: < -47 dBm |
| typical receive sensitivity | -101 dBm (PER ≤ 1%) |
| saturation (max input level) | ≥ 10 dBm |

Power, Physical, & Environmental

| | |
|--------------------------|--|
| input voltage | <ul style="list-style-type: none"> 22-26 VDC (24VDC nominal) 9-15 VDC (12 VDC nominal) |
| power consumption | less than 700 mW (min w/out cell modem) |
| dimensions | <ul style="list-style-type: none"> single-slot: 7" x 4.5" x 1.1" (18cm x 11.4 cm x 3 cm) double-slot: 7" x 4.5" x 2.3" (18 cm x 11.4 cm x 6 cm) (optional) APCC-SPP: 4.7" x 3.5" x 2.4" (12 cm x 9 cm x 6 cm) Isolator: 6.5" x 3" x 1.3" (17 cm x 8 cm x 3 cm) |
| weight | <ul style="list-style-type: none"> single-slot: 7.9 oz (224 g) double-slot: 10.5 oz (298 g) (optional) APCC-SPP: 14.1 oz (400 g) Isolator: 5.6 oz (159 g) |
| operating temp | industrial -40°C to 80°C |

APCC Front Panel User Interface

| | |
|-----------------|--|
| controls | <ul style="list-style-type: none"> MASTER RESET: reset board CHANNEL RESET: ignore events and clear pending events (all channels) |
| LEDs | <ul style="list-style-type: none"> CH1, CH2, CH3, CH4: on/vehicle present or no sensors detected; off/vehicle not present or channel disabled; blinking: vehicle detected LINK: on/operational; off/no link; blinking/active FAULT: on/an enabled channel has a fault |
| switches | <ul style="list-style-type: none"> RX termination for SPP ports shelf and slot address |

Available Products

| Products | Description | Detection Data Interfaces | | |
|------------|---|---------------------------|----------|---------------|
| | | 10/100 Base-T | GSM/GPRS | CDMA200 1xRTT |
| APCC-M | APCC Module | ● | | |
| APCC-M-E | APCC Module with Enhanced Ethernet | ● | | |
| APCC-MP-E | APCC Module, Peripheral Support (I/O Board without modem) | ● | | |
| APCC-MP-EA | APCC Module Peripheral Support | ● | | ● |
| APCC-MP-EG | APCC Module Peripheral Support | ● | ● | |
| APCC-MP-EV | APCC Module Peripheral Support | ● | | ● |
| APCC-ACC-1 | APCC Accessory Isolator | | | |
| APCC-SPP | APCC Serial Port Protocol (Digital Radio) | | | |

Compliance

| | |
|--------|---|
| safety | 2006/95/EC |
| EMC | <ul style="list-style-type: none"> FCC: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. 2004/108/EC |

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