FlexAP

The Sensys Networks VDS240 Wireless Vehicle Detection System uses pavement-mounted magnetometer or MicroRadar® sensors to detect the presence and movement of vehicles and bicycles. The magnetometer and MicroRadar® sensors are wireless, transmitting their detection data in real-time via low-power radio technology to a nearby Sensys Networks access point that then relays the data to one or more local or remote traffic management controllers and systems.

The Sensys Networks FlexAP is an intelligent device operating under the Linux operating system that maintains two-way wireless links to a vehicle detection system's sensors and repeaters, establishes overall time synchronization, transmits configuration commands and message acknowledgements, and receives and processes data from the sensors. The FlexAP then relays the sensor detection data to a roadside traffic controller or remote server, traffic management system, or other vehicle detection application.

The FlexAP is the second generation of Sensys Networks access points and replaces the AP240. The FlexAP includes a higher sensitivity radio for more robust wireless links and more processing and memory capacity for additional applications. The FlexAP is housed in a robust enclosure that provides excellent protection against the environment.

Types of FlexAPs. A FlexAP uses a single cable to support 10/100Base-T Ethernet communications and, in some versions, serial communications to the contact closure card that furnishes the interface to standard traffic controllers.

FLEX-AP-S, FLEX-AP-ES
- RJ45 port supports serial interface to Contact Closure card (CC card) for relay of vehicle detection output via the EX cards or FlexConnect SDLC link
- Supports Ethernet interface for field configuration (via Sensys Networks AccessBox)
- Statistics processing of sensor detection data only in FLEX-AP-ES
- 48VDC power input from CC card via RJ45 port

FLEX-AP-D, FLEX-AP-ED
- RJ45 port supports Power-over-Ethernet (PoE) interface for relay of detection data directly to controller
- Supports field configuration over the Ethernet interface
- Statistics processing of sensor detection data only in FLEX-AP-ED
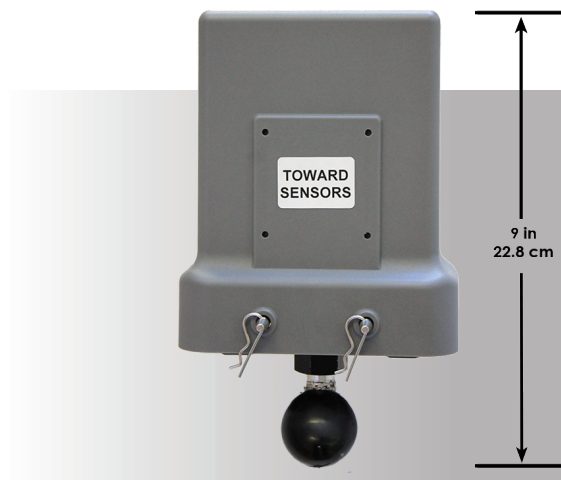- 48VDC power input from PoE interface (adapter required)

Functions / Features

Sensys Networks radio communications
- To/from wireless sensors
- To/from repeaters

Relay of sensor data
- Via contact closure signals, FlexConnect SDLC link, or Ethernet interface to traffic controller

Functions / Features (cont.)

Relay of sensor data (cont.)
- Via IP connectivity (wired or wireless) to traffic management systems, upstream servers, etc.

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)
- Data storage (processed data)

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 40-99)

Firmware upgrades
- Upgrades via IP connectivity or via local PC connection
- Delivers 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 or mounting stability

Enclosure
- Robust protection against outside environment
- Cable connects straight to board, removing one bulkhead connection on the outside of enclosure

Software Compatibility
- Requires TrafficDOT software 2.12.7 or later

Functional Specifications

interfaces	• to/from sensors via 802.15.4 PHY radio • to/from repeaters via 802.15.4 PHY radio • to/from configuration device (PC) via TCP/IP over 10/100Base-T Ethernet • to roadside traffic controller via contact closure, SDLC link, or Ethernet interface • to/from central network management/data collection facilities via TCP/IP
IP connectivity	• Telnet, FTP, HTTP, PPP, PPTP, optional encryption over tunnel • 10/100Base-T via RJ45 connector
per-lane data processing	• counts (volume) • occupancy • average and median speeds • binned speeds and vehicle lengths over selectable time intervals
per-vehicle data processing	• initial vehicle detect time • gap • speed • length
memory resources	• ~500 kB for event caching • ~1 MB for processed data storage
processor	• 400 MHz ARM9 processor • Linux 3.14 operating system • 256 MB Flash • 128 MB SDRAM
over-the-air protocol	Sensys 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	16
channel bandwidth	2 MHz
antenna type	microstrip patch antenna (side with Toward Sensors label)
antenna field of view	±60° (azimuth & elevation)
nominal output power	+3 dBm
spurious emissions	• 30 - 1000 MHz: < -36 dBm • 1 - 12.75 GHz: < -30 dBm • 1.8 - 1.9 GHz: < -47 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	• via PoE cable to RJ45 connector • 36-58 VDC (48 VDC nominal)
power consumption	• FLEX-AP-S, -D, -ED, -ES: 2 W
dimensions	• 9" x 4.8" x 3.8"/22.8 cm x 12.1 cm x 9.6 cm
weight	• FLEX-AP-S, -D, -ED, -ES: 1.6 lbs/0.7 kg • mounting kit: add'l 1.2 lbs/0.5 kg
environmental	• designed for weatherproof, outdoor operation
operating temp	-40ºF to +176ºF/-40ºC to +80ºC

Types of Access Points

Order Codes	stats processing capability	detection data interfaces		
		contact closure	SDLC	10/100 Base-T
FLEX-AP-S		●	●	●
FLEX-AP-ES	●	●	●	●
FLEX-AP-D				●
FLEX-AP-ED	●			●

Compliance

EMC	• 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. • Note: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. • IC: This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. • IC : Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Local Distributor