

## COMPONENTS

The following is a brief description of each component of the COPS™ system.

### Cover Open Transponder (COT)

The COT is a sealed package containing an RF transceiver, batteries, and a method of sensing the position of the manhole cover. The package is made of ABS plastic, a material that is tolerant to cold weather and to substances that should normally be encountered in a manhole. Other plastics can be used for packaging to accommodate special situations.

The COT electronics module is designed specifically for operation with the Zigbee communications protocol. The module has a very low power sleep mode with a timer that is programmed when the system is configured. A typical sleep time is 10 seconds. Each ten seconds, the electronics wakes up, checks its status including battery level, and then transmits an 'all ok' message to a nearby transceiver. It listens for an 'all ok' message back from the transceiver, then it goes back to sleep for another ten seconds.

If the COT has detected an open manhole, it transmits an alarm message and it may stay awake or change its sleep timer so that it is available to perform additional tasks. If the COT does not hear a response from a transceiver, it will stay awake and transmit messages to re-establish communications. After the manhole cover is replaced and the COT receives a message saying that all is back to normal, it will return to its original operating cycle.

The useful life of the COT battery pack is ten years.



The COPS™ system provides a complete solution to a long standing need to protect manholes and other Critical Underground Infrastructure access points from unauthorized entry.

Unique network and sensor devices require no hardwired source of power, allowing great flexibility in the protection of a critical resource.

A self-configuring network, and flexible software are integrated to provide Critical Infrastructure protection when and where it is needed.

Announcing  
the



A vital new  
surveillance and protection  
system for  
Critical Underground Infrastructure



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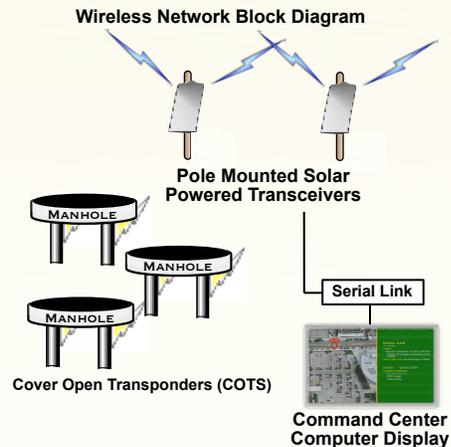
Announces the Cover Open Protection System™

**COVER  
OPEN  
PROTECTION  
SYSTEM™**

**COVER OPEN  
PROTECTION SYSTEM™**

The COPS™ Cover Open Protection System detects and reports the unauthorized opening of manhole covers. Alarms are announced both visually and audibly at a monitoring station. When an alarm occurs, the location and description of the manhole are displayed. Additional displayed information includes critical infrastructure that is associated with, or accessible through, this access point. A monitoring station operator acknowledges the alarm at the computer display and initiates the approved response procedures. Changes to the status of the manhole cover will be logged and the operator will be notified when the cover is replaced on the manhole.

The COPS™ system provides a complete solution to a long standing need to protect manholes from unauthorized entry. Unique network and sensor devices require no hardwired source of power, allowing great flexibility in the protection of a critical resource. A self-configuring network, and flexible software are integrated to provide manhole protection when and where it is needed.



Above is a simplified block diagram of the COPS system. Manholes each contain Cover Open Transponders (COTS) that monitor the status of the manhole cover. COTS communicate with the transceiver network, which uses the Zigbee® RF protocol to provide very reliable communications with minimal power needs. Point to point RF links or other communications paths will be used as required to provide communications between the monitoring center and groups of protected manholes in separate locations.

Cover Open Transponders (COTS) are completely self-contained, waterproof and weatherproof units that require no routine maintenance.

COTS have no wires or connectors and no mechanical switches to cause problems in the potentially harsh environment of a manhole.

COTS will operate for up to ten years on a self-contained internal battery system. Actual battery life is dependent on the programmed configuration of the COT.

COTS are easily installed by placing straps around its cylindrical body and securing the straps to the wall of the manhole.

Transceivers are self-contained, waterproof and weatherproof units powered by attached solar panels. There's no need for connection to any external power source.

Transceivers are easily attached to light standards and other structures, making installation fast and simple.

Transceivers and COTS use the Zigbee protocol that is self-configuring, so that a network is in place as soon as the transceivers and COTS are installed.

Continuously running automated Diagnostics and Self-Test features report any signal loss, or low power level and their locations the monitoring center.

Network redundancy ensures that an alarm is never missed in case of a transceiver failure.

All power sources are designed for a ten-year operating life. The system continuously monitors all power sources. Aging batteries or damaged solar panels will be detected and reported to the monitoring center.

Firmware (software) can be uploaded over the Zigbee wireless network. This eliminates the need to physically access any device to install firmware upgrades.

The robust Zigbee protocol is designed specifically to avoid interference from Wi-Fi and other wireless networks and devices operating in the 2.4 Gigahertz radio band.



**SYSTEM FEATURES**

- Cover Open Transponders (COTS) are completely self-contained, waterproof and weatherproof units that require no routine maintenance.
- COTS have no wires or connectors and no mechanical switches to cause problems in the potentially harsh environment of a manhole.
- COTS will operate for up to ten years on a self-contained internal battery system. Actual battery life is dependent on the programmed configuration of the COT.
- A COT is installed quickly by placing straps around its cylindrical body and securing the straps to the wall of the manhole.
- Transceivers are self-contained, waterproof and weatherproof units that are powered by attached solar panels. They do not need any connection to a separate external source of power.
- Transceivers are attached to light standards and other structures
- Transceivers and COTS use the Zigbee protocol that is self configuring, so that a network is functional as soon as the transceivers and COTS are installed.
- Continuously running automated Diagnostics and Self-Test features report faulty components and their locations to the monitoring center.
- Network redundancy ensures that an alarm is never missed in case of a transceiver failure.
- The system monitors all power sources. Aging batteries or damaged solar panels will be detected and reported automatically.
- Firmware (software) updates or changes can be uploaded over the Zigbee wireless network. This eliminates the need to physically access any device to install firmware upgrades or changes to the software.
- The robust Zigbee protocol is designed specifically to avoid interference from Wi-Fi and other wireless networks and devices operating in the 2.4 Gigahertz radio band.