

## CREATING A NATIONWIDE WIRELESS DETECTION SENSOR NETWORK FOR CHEMICAL, BIOLOGICAL AND RADIOLOGICAL THREATS

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### Background

Cell phones are ubiquitous and notably concentrated in all key US terrorist target areas, providing one of the best opportunities to establish a national wireless sensor network detection “blanket” against radiological, chemical and biological threats. This fact was recently recognized by the US Department of Homeland Security (DHS) in an initiative called “Cell-All”<sup>1</sup>.

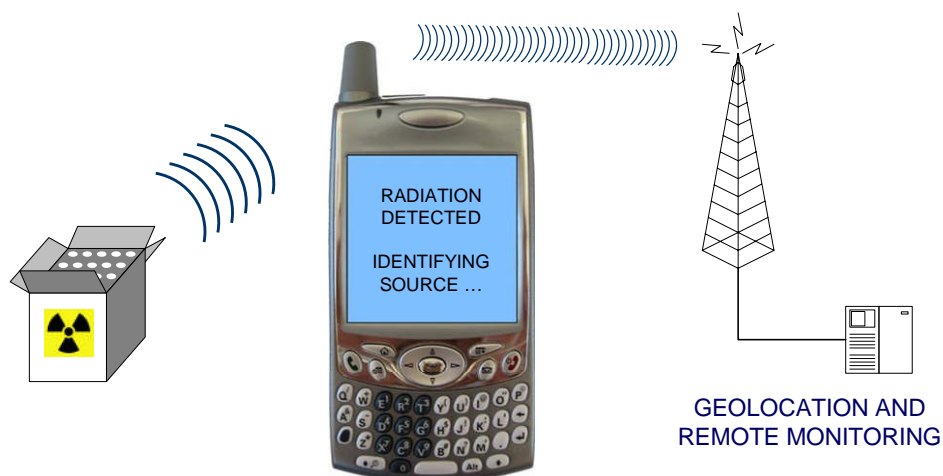
To implement this DHS initiative, a new type of cell phone can be manufactured and distributed to all those who come in close proximity with items shipped into, or across, the US, including Delivery Services, Trucking, USPS, Federal, State and Local Law Enforcement, Airlines, Airports and TSA, Rail, Mass Transit and Ports (approximately 5 million people).

This new phone should integrate in a single, low cost device the many and various sensor features required for simultaneous detection of biological, chemical and radiological threats, regardless of location within the United States.

This document offers details for creating a common, low cost detection platform and describes the patent foundation for the technology. Creating the common wireless platform can bridge the radiological, chemical and biological detection needs of agencies like DHS in a single, low cost device.

### (1) Radiation Detection

A sophisticated radiation sensor, such as a Cadmium Zinc Telluride (CZT) produced by eV Products, and associated electronics that can discriminate between radiation sources can be reduced to a single chip (ASIC) and integrated directly into a cell phone by cell phone manufacturers under existing patents<sup>2</sup>.

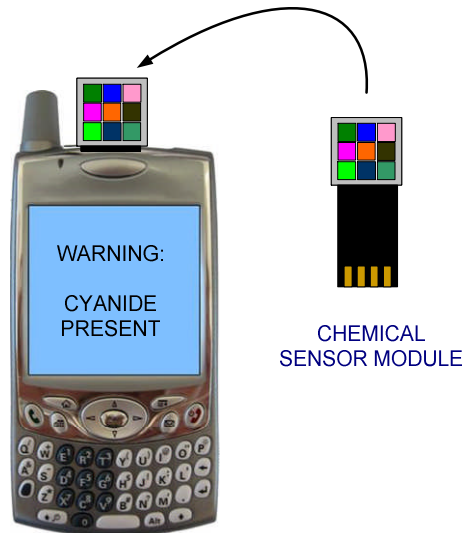


<sup>1</sup> [http://www.usatoday.com/tech/news/techpolicy/2007-05-03-cellphone-attack-detector\\_N.htm?csp=23](http://www.usatoday.com/tech/news/techpolicy/2007-05-03-cellphone-attack-detector_N.htm?csp=23)

<sup>2</sup> <http://public.cq.com/docs/hs/hsnews110-000002524221.html>

**(2) Chemical Detection**

In addition to providing a built-in radiation sensor, chemical sensor requirements can also be accommodated, with the best approach being to add to a modified cell phone a standard sensor port (e.g. SDIO) for an interchangeable miniature multi-chemical sensor module that can be replaced, as necessary, and adapted for any chemical detection need (see illustration below).



**(3) Biological Detection**

Biological sensor modules can also be used with a sensor port, but such sensors may be costly to use for the immediate future. A lower cost alternative is to add to the cell phone an RFID reader chip to read remote, disposable wireless RFID sensors. Such sensors can be for any application (chemical, radiological or biological) but specifically will include low cost disposable biological sensors (immunoassays that are similar to pregnancy tests), as illustrated below for anthrax or any other bioterrorism agent. Disposable printable immunoassays combined with RFID (or RFID electro-immunoassays) can be produced that will detect any pathogen, anywhere and this capability is covered under US Patent 10/530,901.

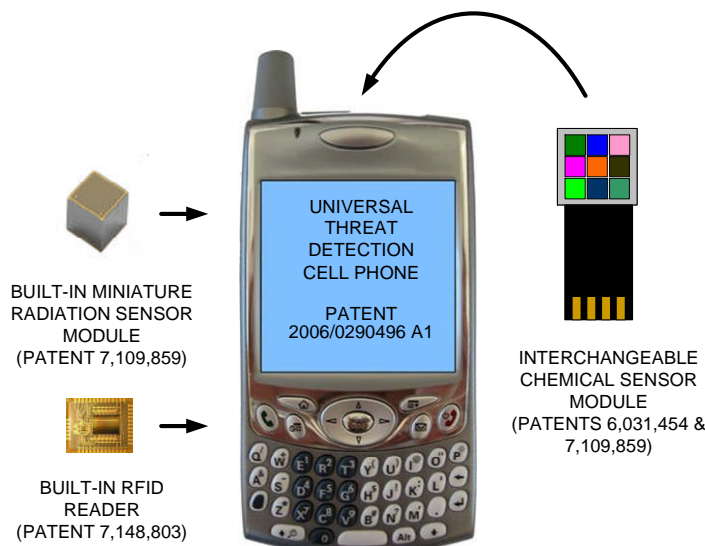


By combining an RFID reader and a radiation sensor in a cell phone, the need for sophisticated and expensive “high end” detectors is significantly reduced because authentication of suspicious packages can be instantly achieved via the data (e.g. the given expected radiation spectrum or signature) associated with the unique ID of the RFID tag. These data would instantly download into a cell phone from a remote web server, as explained in US Patent 7,148,803 and overlays what the cell phone detects to validate legitimate shipments. In other words, false positives can be avoided for legitimate medical, scientific or industrial radiological shipments. The only component required (in addition to the phone) would be to mandate that all radiological packages shipped in the US be labeled with disposable wireless RFID tags.



### Intellectual Property and Patents

The concept of turning a cell phone into a personal “universal” threat detector was first patented ten years ago by Gentag, Inc. The technologies described above are covered under the following Gentag patents: **Patent 6,031,454**; **Patent 7,109,859**; **Patent 7,148,803**; **Patent Application 10/530,901** and several additional pending divisional applications.





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### **Features of a Universal Threat Detection Cell Phone**

The cell phone would resemble an ordinary cell phone, but would have the following added features and benefits:

- Real time detection, geolocation, and remote validation of radiological threats
- Real time authentication of any package (via low cost RFID tags)
- Real time detection of given chemical threats (depending on the selected module)
- Ability to read either wireless or modular biological sensors
- Instant update, sensor calibration, and RFID validation, anywhere in the world
- Ability to upgrade and adapt to future sensors (sensor modules or RFID sensors)

### **Cost**

Production of a special use universal threat detection phones for Homeland Security is similar to manufacture of any currently available phone and requires a one-time investment by the US Government to cover engineering, miniaturization, and integration costs. In addition to covering manufacturing costs, a cell phone OEM will require a guaranteed minimal market for the new cell phone, which therefore also needs to be guaranteed by the US Government. In terms of manufacturing, the main costs are ASIC production of a miniature radiation sensor and integration of specific technologies into a single unit.

Cell phone prices are highly volume dependent. Universal threat detection phones can be estimated at approximately \$800 per unit (low volume) to \$300 per unit (high volume).

### **Conclusion**

The combination of a cell phone with built-in radiation sensor, RFID reader chip, and external sensor port provides a new type of low cost, universal cell phone meeting current and future threat detection needs of DHS, the US Department of Defense, and the US Department of Energy. This device can be manufactured very quickly and the technology widely distributed across the US. The technology can also be deployed within NATO and other countries worldwide seeking a wide area, low cost universal threat detection technology.

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