

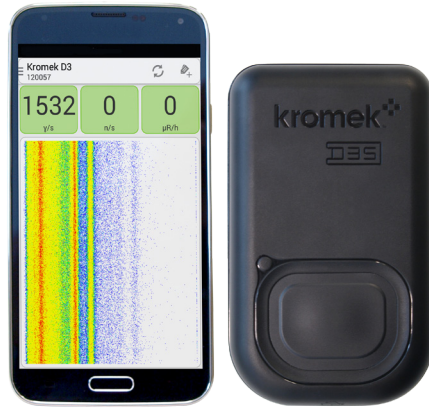
# Safeguarding Cities



## “Dirty bomb threat now a reality”

Today, nine nations have the capability to make a nuclear weapon and, the components for a nuclear weapon, or a much simpler radiological dirty bomb, can be found anywhere around the world. One terrorist detonation could be catastrophic and could escalate the threat of nuclear war.

So, if a weapon, or the materials needed to make one, is being transported to a particular target, how do we make sure we find it in time?



D3S-NET Integrated detector network that guards against the threat of nuclear terrorism and ‘dirty bombs’

- Multiple detectors
- Multiple locations
- Paired with smartphone
- Fixed and mobile detectors
- Continuously mapping radiation levels
- Cloud augmented WAN continuously assesses data against threats

## How can you monitor a city for the presence of radioactive materials in an area that covers many square kilometres?

The D3S-NET allows you to manage multiple risk scenarios, in areas such as:

- residential estates
- commercial properties
- retail environments
- industrial estates and cities
- derelict land
- warehousing and storage
- multi-storey parking

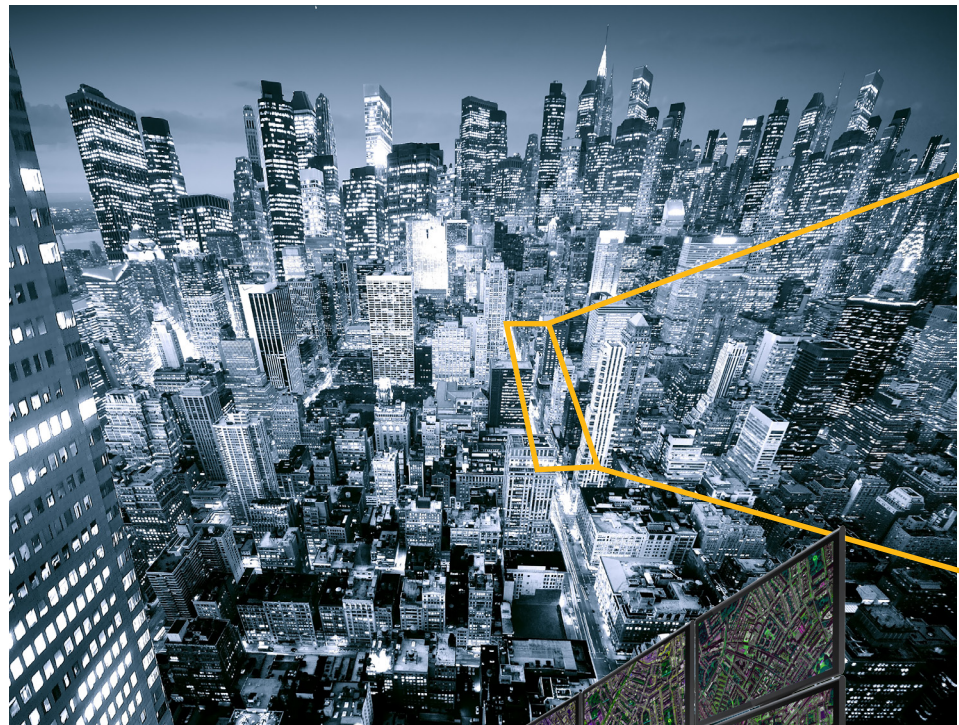
### The technology

Kromek has combined two of its leading technologies: the non-He3 compact thermal neutron detector and its world-leading gamma detector, into the ground-breaking third generation ‘Discreet Dual Detector’, D3S.

The D3S hybrid gamma/neutron platform uniquely combines high sensitivity and small form factor together with a long-life battery power source making it the ideal portable instrument.

The D3S-Net is a three-part application and can be easily used by non-expert users. Sigma Service is used to link the D3S to the phone to collect spectra, gather location data and forward this onto the central dTect web-based application for expert analysis and adjudication in real-time. This runs quietly in the background without the user seeing any information or results.

The Sigma Spectrum application is used to give the user information and results. They can easily view an all clear or warning message. More advanced users can view the number of gamma and neutron counts per second, as well as the dose rate and view spectra.



*Discreet wearable design, lightweight and small*

## How it works

The award winning algorithm provides a novel approach for radiological background estimation that improves the detection and discrimination capability of medium resolution detectors.

This ground-breaking technology enables the creation of agile, cloud augmented wide area radiation detection networks combining fixed and portable sensors, that will continuously monitor radiation in urban and other environments, and that can learn and adapt in real-time to provide significant defensive capability against the threat of nuclear terrorism and so-called 'dirty bombs'.

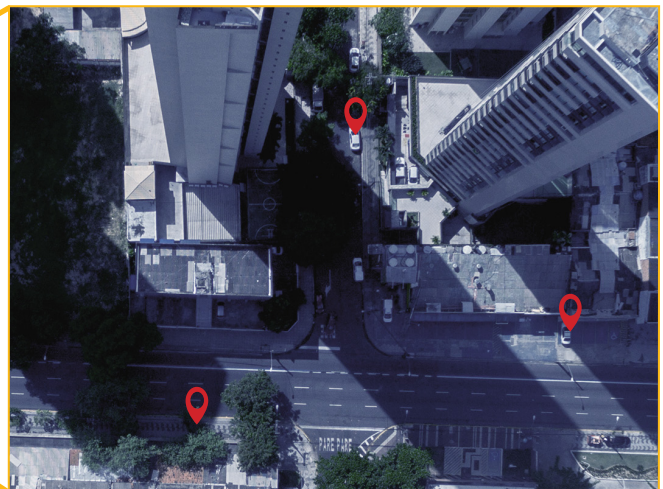
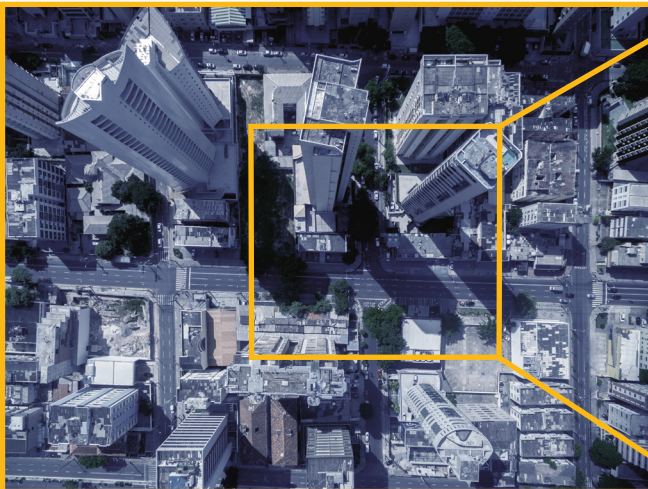
Kromek uniquely delivers the cost and performance needed for implementation of fixed, mobile and drone

networks. A continuous, always-on and affordable wide area monitoring capability.

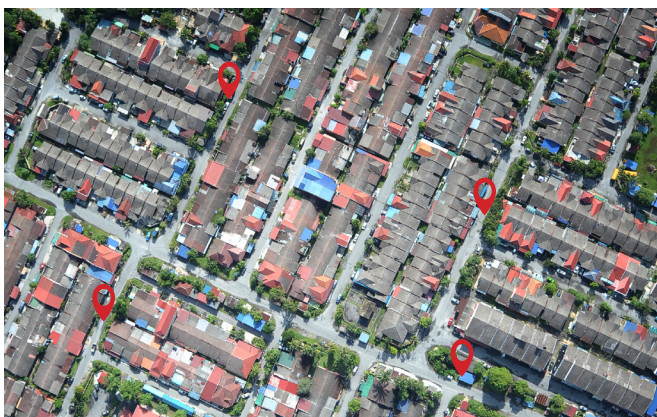
Multiple detectors (up to 10,000) can be fixed or carried by people or vehicles. Data is collected and sent to central point for analysis. With this information continuously coming in, a 2-dimensional heat map can be built up showing areas of interest.

The system is continuously assessing the data against threats. Where detectors converge in an area, the system aggregates that detector data intelligently and then compares it against a threat template. If threats are found, it can then elevate and alert for action at a higher level.

Using large numbers of detectors makes it difficult for people to know or guess who/what/where is being scanned and therefore difficult to circumnavigate.



*If threats are found, it can then elevate and alert for action at a higher level.*



*Collected data is used to create a radiological heat map*

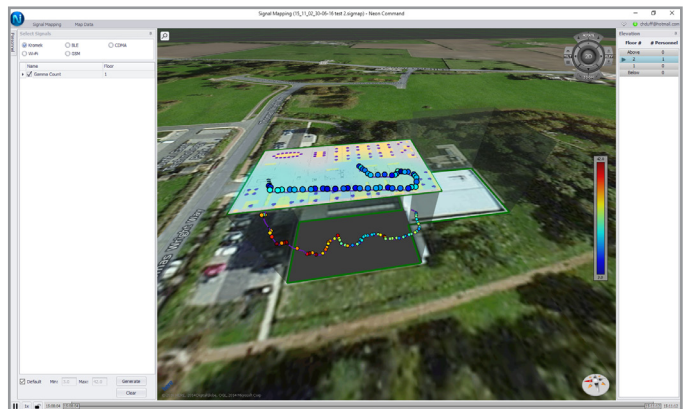
Specifications:	
Gamma detector	7% resolution @ 662 keV
Gamma energy range	30 keV to 3 MeV
Gamma sensitivity	500 cps/μSv/h (5 cps/μR/h)
Maximum throughput for gamma channel	10,000 cps
Dose rate	Up to 15 μSv/h @ 662 keV (1.5 mR/h)
Neutron detector	Sensitivity 12 cps/nv
Neutron detector gamma rejection	Better than 10 <sup>-7</sup>
Maximum throughput for neutron channel	10,000cps
Communications	Micro USB Bluetooth®
Operational battery life	12 hours
Operational temperature range	-20 to 50°C
Size	132mm x 80mm x 23.5mm (5.2"x 3.1"x 0.9")
Humidity	Up to 93% RH
Moisture/Dust	IP53
Weight	237 g (0.52 lbs)
Battery	1450 mAh Lithium polymer
Charging	Inductive charging Charging via USB
External LED's	Visual detector status
Software interfaces	Android phone with supplied app

**Tested to ensure compliance with the following standards:**

- Temperature as per ANSI N42.32 section 7.1
- Temperature shock as per ANSI N42.32 section 7.2
- Humidity as per ANSI N42.32 section 7.3
- Moisture/dust protection as per ANSI N42.32 section 7.4
- Cold temperature start-up as per ANSI N42.32 section 7.5
- Vibration as per ANSI N42.32 section 9.1
- Neutron channel gamma rejection as per ANSI N42.34 section 6.18
- ESD immunity as per ANSI N42.32 section 8.1
- Radiated emissions as per ANSI N42.32 section 8.4
- Drop test as per ANSI N42.32 section 9.2
- Impact (microphonics) as per ANSI N42.32 section 9.3

## In-building tracking

2-dimensional ground level and single-storey building data can be augmented by upgrading software options to include 3-dimensional in-building tracking enabling data to be mapped over multiple floors.



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### Kromek Group plc

**Kromek Ltd** NETPark Thomas Wright Way Sedgfield County Durham TS21 3FD UK T: +44 (0) 1740 626060

**Kromek USA** 373 Saxonburg Blvd Saxonburg PA 16056 USA T: +1(0) 724 352 5288

E: sales@kromek.com W: www.kromek.com