

## INNOVATIONS IN NEXT GENERATION CB THREAT CHARACTERIZATION AND ASSESSMENT FOR DECISION SUPPORT

# Reconnaissance And Surveillance Planning And Offroad Routing With Cb Hazards At The Tactical Edge

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Reconnaissance and surveillance directly support the warfighting function of intelligence gathering to provide commanders with an understanding of the operational environment. Although the intent differs between reconnaissance and surveillance, the techniques are similar. Patterns are used to either locate the source or map the extent of a hazard. A total of four locate and six survey routes are currently implemented in the CBRN Routing tool. Locate patterns start with a pre-defined area and generate the entire path beforehand, taking measurements at set intervals along the way. Survey patterns use an iterative “sub-route” that alternately plans the segment, takes a measurement, and repeats until a stop criterion is met (e.g. return to start). In addition, a mock sensor was developed to sample a virtual hazard in order to simulate a real-life device that collects data from an actual release.

Contamination avoidance is an activity under passive defense that seeks to avoid or control CB exposure to personnel. Mobile units have the option to leave a hazard area or determine a new route through it. The CBRN Routing tool assists operators with planning and carrying out missions in hazardous environments by integrating CBRN environment characterization with routing and navigation algorithms. Reliant on the Effects and Vehicle Navigation System (VNS) tools, CBRN Routing was originally developed to enable mounted operators to include CBRN hazards in routing decisions. Results from the Effects tool are used to create a CBRN overlay for use by one of several algorithms that balance exposure with travel time.

For mounted operations, travel is restricted to roads represented by a collection of segments and nodes. This road network may be downloaded from a public source or a custom one may be imported. An initial prototype for offroad routing with dismounted units relied on Ground Guidance, a separate app that considered terrain elevation and landcover to calculate an optimal route. Its successor, Trailblazer, is implemented as an Android Tactical Assault Kit (ATAK) plugin and generalizes datasets as “cost surfaces”. Translating a CBRN hazard to a time-dependent cost surface enables this factor to be considered when calculating a dismounted route.

ATAK plugins leverage built-in situation awareness and data sharing capabilities of TAK, a geospatial collaboration platform with a growing ecosystem of 250,000 users. Routes and CBRN hazards are easily transferred between distributed teams and across echelons. Connection to a TAK server provides additional features such as TLS 1.3 encryption, mission packages, and additional computing resources. An extensible plugin architecture enables rapid development of capabilities that would otherwise be deployed as standalone applications without the common infrastructure provided by TAK.

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