June 2012

North Korean Jamming of GPS Systems

TRADOC G-2 Intelligence Support Activity (TRISA)

Complex Operational Environment and Threat Integration Directorate (CTID)

TRADOC Intelligence Support Activity (TRISA)

Purpose

- To inform deploying units, trainers, and scenario writers of recent GPS signal jamming experienced by South Korea.
- To identify the most likely responsible party and motives.
- To explore the possible effects of similar jamming in the future.
- To explore the training implications of such events.

Executive Summary

- South Korea has experienced GPS signal jamming three times during the past three years.
- The jamming source was traced by South Korea to locations in North Korea.
- Jamming occurred during joint U.S.-South Korea exercises and after a failed North Korean missile launch.
- The jamming had no significant impact on civilian or military operations.
- Future jamming may impact international relations or warfighting functions due to resulting accidents, unintentional crossing of international borders or weapon delivery guidance system failures.

Map of the Korean Peninsula and Environs

Introduction

During the past two years, South Korea experienced GPS jamming three separate times from signals originating in North Korea. Two of these episodes occurred during joint U.S.-South Korean exercises, and the third took place shortly after North Korea experienced a failed rocket launch attempt. It is likely that North Korea used the jamming to react to supposed threats in the first two incidents and a perceived loss of face in the third. The jamming had no significant impact in affected areas, but future results of this North Korean capability may not be so benign.

Incident #1 - August 2010

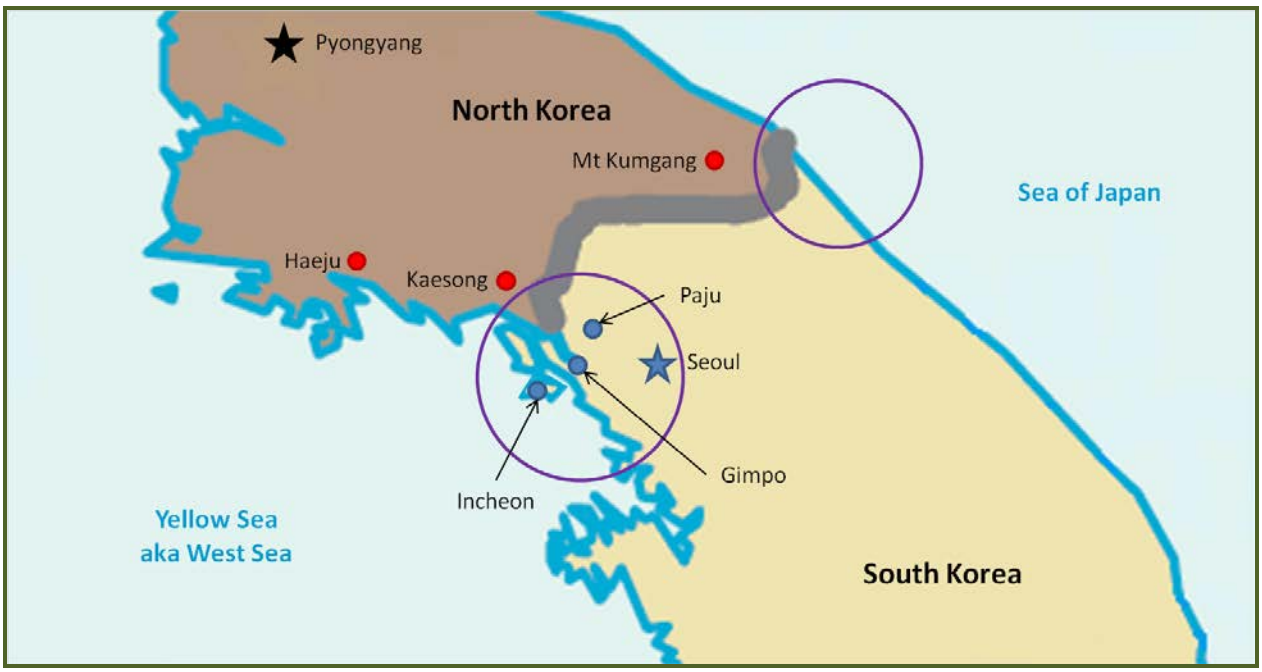
The first time South Korea experienced GPS jamming from North Korea was 23-25 August 2010. The annual joint U.S.-South Korean exercise Ulchi Guardian Freedom was in progress when GPS signal receivers began to malfunction in areas around South Korea's west coast and the cities of Gimpo, Munsan, and Ilsan. Military and civilian GPS receivers on both land and sea were affected, including military and civilian vessels on the west coast and land-based mobile phone providers. Signals were jammed multiple times over the course of three days, with the jamming lasting as long as 10 minutes each time. Though these intervals were too short to pinpoint the exact origin of the signals, South Korea was able to trace them to the Kaesong border area of North Korea.

First Jamming Incident.

Red circle denotes jamming source, blue circles denote affected cities, purple oval denotes approximate area affected.

Incident #2 - March 2011

South Korea's second occurrence of GPS jamming was 04-13 March 2011, during U.S.-South Korean joint exercise Key Resolve/Foal Eagle. The signals took place at 5-10 minute intervals and were strong during the first two days of jamming, but lessened significantly thereafter. Unlike the first incident, signals originated from three different locations in North Korea – Kaesong, Haeju, and Mount Kungang – and affected both east and west coasts. GPS-enabled civilian mobile phones and military telecommunications, navigational, and measurement equipment were affected around Seoul, Incheon, and Paju. Some civilian flights at Incheon and Gimpo airports were also affected, as were South Korean naval patrol and speedboats. South Korea stated that a U.S. reconnaissance plane was forced to land 45 minutes after take-off due to GPS jamming, but the U.S. government denied the report. The South Korean government sent a letter to protest the jamming, but the North Korean government refused to receive said letter.



Second Jamming Incident.

Red circles denote jamming sources, blue circles denote affected cities, purple ovals denote approximate areas affected.

Incident #3 - April/May 2012

The third jamming episode occurred 28 April-14 May 2012, just two weeks after North Korea's failed rocket launch attempt on 13 April. Again originating from the Kaesong area, the jamming affected airline flights, sea-borne vessels, and taxis operating in the west coast and central peninsula area. Cities affected included Incheon and Gimpo (airplane take-off and landing), Osan and Taean (airplane overflight), and Seoul (taxis). A total of 674 flights were affected, including one U.S. military flight, and there were four "close calls" when pilots unexpectedly changed course during landing. Over one hundred ships and boats experienced the jamming – including eight South Korean coast guard patrol boats – and at least one fishing vessel came close to drifting into North Korean waters as a result of GPS failure. North Korea denied the jamming, and again refused to accept a letter of protest sent by the South Korean government. The jamming only ceased after China and South Korea agreed to coordinate their responses to it on 14 May.

Third Jamming Incident.

Red circle denotes jamming source, blue circles denote affected cities, purple oval denotes approximate area affected.

Analyst Assessment

Current open-source reporting indicates that North Korea possesses two types of GPS jammers. The first is a vehicle-mounted platform that was imported from Russia in the early 2000s and has a range of up to 100 km (62 miles) – likely produced by the Russian firm AviaConversia. The second platform is an organic modification of the Russian jammer, which North Korea is marketing to Middle Eastern countries.

Though North Korea denied being the source of the most recent jamming, it was undoubtedly responsible for all three incidents. The country has established a pattern of striking out at its southern neighbor through words, actions, or both, on occasions when in need (e.g. humanitarian aid), feeling threatened, or wishing to save face after a recent failure. All three jamming episodes corresponded with such occasions, namely two U.S.-South Korean joint exercises and the 13 April 2012 failed rocket launch attempt. In addition, the last two occurrences were also accompanied by verbal threats of war from North Korea.

The jamming had little impact on civilian and military operations. South Korean military transport does not use GPS as its primary navigational method and was unaffected. Civilian flights switched to alternate methods when their GPS systems failed. Mobile phone and taxi GPS malfunctions were inconvenient, but not inherently dangerous.

There were only a few potentially serious events that occurred during the jamming episodes. Fishing vessels were more likely to have few back-up systems in the event of a GPS failure, and thus faced the danger of accidentally drifting into North Korean waters. Civilian flights that experienced problems during landing were a concern, but only when the pilot changed course without warning. The U.S. reconnaissance plane that was reportedly forced down would have had multiple navigational methods available; the pilot likely chose to err on the side of safety when the GPS malfunctioned and returned to base.

Though there have been no major effects from these incidents to date, this may not hold true in the future. A major accident could easily happen: a pilot's decision to change course due to GPS failure on landing could cause an air-air or air-ground collision, or a fishing boat could hit a reef or run aground. Vessels experiencing GPS failure could also drift into North Korean waters, thus risking seizure or sinking and sparking an international incident. In an actual conflict scenario, munitions relying on GPS could miss their target and cause significant collateral damage.

Training Implications

- The current South Korean operational environment includes the potential for GPS jamming by North Korea.
- This jamming affects water-borne vessels, civilian and military aircraft, and GPS-enabled devices such as mobile phones.
- This jamming is more likely to occur under three specific circumstances:
    - when North Korea finds itself in need (e.g. humanitarian aid)
    - when North Korea feels threatened (e.g. joint U.S.-South Korean exercises)
    - when North Korea experiences a humiliation (e.g. failed missile launch)

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See also the Red Diamond Newsletter, which contains current articles on a variety of topics useful to both soldiers and civilians ranging from enemy TTP to the latest news on cyberspace developments.

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