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Leveraging the Canadian Surface Combatant for Ballistic Missile Defence

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Credit: Royal Canadian Navy



A rendering of the Canadian Surface Combatant, now named River-class destroyer, as posted on LinkedIn by the RCN in summer 2024.

While Canada contributes personnel to the Ballistic Missile Early Warning Mission as a part of the North American Aerospace Defence Command (NORAD), Canada currently lacks the ability to intercept ballistic missile threats. The Royal Canadian Navy (RCN) has, however, selected systems for the Canadian Surface Combatant (CSC)¹ which will enable Canada to conduct independent detection of ballistic missiles, and conduct intercept missions.² Through the CSC, the RCN can deliver on Canada's NORAD modernization goals by significantly increasing the Integrated Air and Missile Defence (IAMD) capability of assets declared to NORAD. The combination of a command and control (C2) system with a ballistic missile detection sensor in the CSC project creates the possibility of a seaborne platform with an intercept capability. Paired with the appropriate interceptor, this suite would build Canadian missile defence coverage over a significant portion of Canada which is currently vulnerable to ballistic missile attack.

In a world where threats of ballistic missile attack are rapidly expanding, there is both a national requirement for defence and a further requirement for seaborne ballistic missile defence (BMD). This article contends that leveraging the capabilities of the CSC is crucial for shaping a shift in Canadian policy towards conducting BMD operations. Focused development of BMD competencies in the CSC will strengthen Canada's security in North America through improved integrated air defence delivered via

NORAD, and contribute to global peace and security by delivering a deterrent to hostile actors who threaten ballistic missile attacks.

The Canadian Armed Forces (CAF) have the institutional intention to capitalize on the enhanced capabilities of projects like the F-35 fighter jet, NORAD modernization and the CSC in the coming decade to bolster Canadian participation in missile defence operations. These operations will require improved air defence capabilities across the CAF. NORAD modernization prioritizes improving IAMD but focuses on air-centric aspects and delivery of the F-35.³ However, there is an opportunity to incorporate a maritime element while adding defence capability, crucially expanding Canada's integrated air defence capability and facilitating response from varied and dispersed platforms.

This article examines both past and present Canadian BMD policies, providing an analysis through a comparative approach, evaluating the organization, equipment and deployment strategies of the US Navy's (USN) BMD capabilities. The article advocates for the RCN to utilize BMD capabilities obtained through the CSC project. Specifically, the RCN should employ these capabilities to detect and counter ballistic missiles in support of NORAD and other strategic missions. The comparison is centred on the equipment involved from the USN and in the CSC project which would enable this mission set.

What is BMD?

Ballistic missile defence can be described as “a system, weapon, or technology involved in the detection, tracking, interception and destruction of attacking missiles.”⁴ The concept emerged during the Cold War, focused on countering intercontinental ballistic missiles armed with nuclear warheads. It marked a strategic shift from the deterrence-by-punishment doctrine, exemplified by Mutually Assured Destruction. Instead, BMD exercised deterrence by denial, emphasizing the ability to intercept and neutralize hostile missiles before they reach allied territories.

BMD systems have evolved beyond the Cold War paradigm, adapting to emerging threats. This maturation enables engagement not only of long-range nuclear missiles but also shorter-range, non-nuclear missiles.⁵ This adaptability is crucial in addressing a diverse range of post-Cold War missile threats, including from regional conflicts, and advanced technologies that have proliferated among state and non-state actors, such as the Houthis in Yemen who have used ballistic missiles to attack civilian merchant shipping in the Red Sea.⁶

Canadian Policy

Historically, Canada has had a complex relationship with missile defence initiatives, particularly those advanced by the United States. In the late 1950s, Canada acquired two squadrons of the CIM-10 Bomarc surface-to-air missile for the newly integrated North American air defence system.⁷ Designed to intercept and destroy incoming enemy aircraft, Bomarc became part of the joint defence arrangement symbolized by NORAD. Meant to be equipped with nuclear warheads, the presence of Bomarcs on Canadian soil triggered a public debate on the implications and potential consequences for Canadian security and sovereignty, contributing to the eventual downfall of the John Diefenbaker government.

The US Strategic Defense Initiative (SDI), presented by President Ronald Reagan in 1983, proposed a missile defence system to safeguard the United States and its allies from potential Soviet nuclear missile attacks.⁸ Referred to as ‘Star Wars’ in the media for its ambitious goals, SDI envisioned using ground- and space-based technologies to intercept and destroy incoming ballistic missiles. Prime Minister Brian Mulroney declined Canadian participation, citing sovereignty concerns and complaining that Canada “would not be able to call the shots.”⁹ The Canadian public strongly opposed both the Bomarc missile deployment and the SDI, with opposition raising concerns over national security, sovereignty and the potential escalation of the arms race. This widespread dissent reflected fears that Canada’s involvement in these missile defence programs would entangle the country in US military strategies and increase its vulnerability in a nuclear conflict during the Cold War.

While the SDI never materialized, its elements laid the groundwork for subsequent US programs. In the early 2000s, the issue gained prominence in Canada as the United States proposed a much-reduced missile defence program to counter rogue states with intercontinental ballistic missiles (ICBMs). However, in 2005, Prime Minister Paul Martin decided against joining the US BMD program.¹⁰ The decision was related to concerns about effectiveness, compatibility with Canada’s defence priorities, and a desire to maintain diplomatic independence. While vocal public opposition remained, polls conducted at the time indicated that public opinion had shifted significantly, and that surveys revealed a nearly even split in opinion, with 52% of Canadians opposing participation in the US BMD system and 46% supporting it.¹¹ However, the opposition was notably more passionate, and drove a strong and vocal resistance against the initiative.



A screenshot from a video posted by US Central Command shows the cargo vessel **Marlin Luanda** on fire in the Gulf of Aden after being struck by an anti-ship ballistic missile fired by Houthi rebels, 27 January 2024.

Credit: Petty Officer 2nd Class Aaron Lau



A Canadian Bomarc surface-to-air missile seen during an exercise at a Royal Canadian Air Force base (likely North Bay) between 1962 and 1972.

Canada's current policy regarding missile defence is nuanced but has failed to evolve and is ill-suited for the present security environment. Canada's policy toward the US BMD system has remained unchanged despite the escalating threats from hostile states and non-state actors, and a global security environment that has drastically deteriorated since the 2005 decision. However, Canada has quietly acknowledged the necessity of BMD, particularly within the NATO context. The 2010 signing of NATO's updated Strategic Concept emphasized the need for BMD as a core element of collective defence.¹² The 2012 NATO Deterrence and Defence Posture Review, signed by Canada, highlighted the growing concern and threat posed by the proliferation of ballistic missiles. In 2022 testimony before the House of Commons Standing Committee on National Defence, Director General Continental Defence Policy, Jonathan Quinn, affirmed Canada's significant role in North American aerospace threat detection, including detection of ballistic missiles, and acknowledged the diverse missile threats facing the North American homelands.¹³ The policy contradiction between participating fully in missile detection, but only selectively in engagement – depending on missile type – suggests a lack of understanding among Canadians regarding the nuances of these threats.

The Canadian government acknowledges the importance of defending against ballistic missiles within a NATO context. However, when concerning North American defence, Canada adopts a bifurcated strategy, employing crewed aircraft to engage cruise missile threats while refusing to conduct BMD with the United States.¹⁴ This approach is outdated and leaves Canada susceptible to

various missile threats. Then-Chief of Defence Staff, General Wayne Eyre, highlighted in his 2022 Parliamentary appearance alongside Quinn that the distinctions between missile types are diminishing rapidly, and advocated for a Canadian IAMD system. He emphasized the challenge of targeting specific threats amid the range of potential dangers – i.e., separating cruise missiles from ballistic missiles – and asserted that IAMD is the future operating concept. Two years on from that testimony, IAMD is not just a future concept but a present necessity, requiring a mix of capabilities, including BMD, to counter current and future threats to Canadians.

While Canada's defence policy *Strong, Secure, Engaged*, released in 2017, makes no mention of BMD or IAMD, it repeatedly highlights the escalating risk to regional stability and international peace and security caused by the proliferation of ballistic missiles.¹⁵ The defence policy update, *Our North, Strong and Free* released in April 2024, discusses the need for IAMD to defend against hypersonic and cruise missiles in an increasingly complex threat environment.¹⁶ The policy and update both firmly commit to funding the modernization of NORAD as a key pillar of Canadian defence policy, including investing in IAMD capabilities. Canada's plan for funding NORAD modernization further discusses the increased need to collaborate with the United States in an IAMD system.¹⁷ This is especially critical today, given the danger of evolving missile threats such as hypersonic weapons and improved cruise missile technology. In 2023, then-Defence Minister Anita Anand supported adopting an IAMD concept for Canada via NORAD modernization due to the complexity of contemporary missile threats.¹⁸ While Canada's NATO allies have embraced IAMD, Canada's aged policy involves air platforms intercepting cruise missiles under NORAD, and US national assets engaging ballistic missiles after they are detected by NORAD, creating an artificial seam that an integrated air and missile defence system with a BMD capability would effectively address.

Comparative Analysis of USN BMD

The USN conducts BMD through a multi-layered and integrated approach, utilizing a combination of sensors, C2 systems and interceptor missiles. The primary goal of the system is to detect, track and, if necessary, intercept and destroy ballistic missiles that pose a threat. This is accomplished through the use of the Aegis C2 system deployed on *Arleigh Burke*-class destroyers and *Ticonderoga*-class cruisers.¹⁹ Aegis-BMD is made up of three basic components: sensors, interceptors and command and control.

The primary sensors for Aegis-BMD are Active Electronically Scanned Array (AESA) radars, such as the AN/SPY-1D, or the newer SPY-6 or SPY-7 radars.²⁰ AESA radars are preferred for BMD systems due to several key advantages

that enhance their effectiveness in tracking and engaging ballistic missile threats.²¹ AESA radars contribute to a comprehensive situational awareness by providing a continuous and adaptable view of the airspace. This is particularly crucial for detecting and tracking ballistic missiles in their various phases of flight.

The interceptors in use by Aegis-BMD are the Standard Missile-3 (SM-3) and the Standard Missile-6 (SM-6), both fired from the Mark 41 Vertical Launch System (Mk 41 VLS).²² The SM-3 uses kinetic kill technology, essentially hitting the threat missile in flight with another missile outside of the atmosphere. The SM-6 engages in terminal BMD, which means engaging after the threat missile has re-entered the atmosphere. However, both missiles are effective in the BMD role.

Ballistic missile defence of the continental United States is currently provided by the Ground-based Midcourse Defense (GMD) system operated by US Northern Command, although Aegis-equipped BMD ships have been considered for this task. Primarily due to the number of hulls available, these ships are instead employed in theatres worldwide to safeguard against potential ballistic missile threats from rogue states like Iran and North Korea.²³ These BMD ships have also been operating in the Red Sea since late 2023, defending merchant shipping – and themselves – against Houthi missile attacks.²⁴ The proliferation of ballistic missiles to non-state actors like the Houthis, who are willing to use them against civilian targets, is extremely worrisome, and poses a significant challenge to global security that should gravely concern Canada.

Analysis of Potential CSC BMD Capability

Canada's strategic decision to adopt the Aegis C2 system for the CSC project marks a significant step.²⁵ This choice empowers Canadian vessels to execute BMD operations in a similar manner to the USN. The CSC will also be equipped with the SPY-7 radar and the Mk 41 VLS, providing the required technical components that the USN considers fundamental to conducting BMD.²⁶ With these systems in the CSC framework, the CAF has a path toward a robust IAMD system comprised of more than a single component, amplifying Canadian contribution to NORAD missions dedicated to safeguarding Canadians. These systems, integral to the CSC project, constitute the primary investment required to establish a fully equipped BMD-capable element. From a technical perspective, the only remaining gap is the acquisition of a suitable interceptor, given that the CSC will have the same VLS, sensors and C2 suite that is used by the USN for BMD.

The more challenging shift required is the change in policy to allow the CAF to conduct BMD. The urgency for this policy adjustment and the critical need for BMD capabilities at sea was underscored by Vice-Admiral Angus

Topshee, Commander of the RCN, who stated in recent remarks that “BMD is self-defence for ships now.”²⁷ The RCN needs the CSC to have BMD capabilities to be able to operate effectively at sea, and Canada needs BMD capabilities for a robust IAMD system under NORAD. CSCs delivering BMD capabilities in a period of increased threat from ballistic missiles are the vehicles the CAF should use to advocate for a policy change to permit the conduct of BMD. To navigate the proposed policy change effectively, CAF leadership must actively engage both the government and the public to explain the threat in modern terms.

Recognizing hesitancy rooted in historical sovereignty concerns and public opposition is crucial, but it underscores the need to educate the public on the current state of threats, which differ significantly from those envisioned last century, especially given the evolving complexities of today's international security environment. While the military is expected to act on government direction rather than shape policy, the CAF can still play a leadership role in educating the public by providing clear,



A SM-6 Dual II missile is launched from USS Preble's Mk 41 Vertical Launch System near Hawaii during a flight test on 28 March 2024. The test resulted in the successful interception of a medium-range ballistic missile.

Credit: Missile Defense Agency

factual information about the threats posed by modern missile systems and the fundamentally defensive capabilities that come with BMD. Through educational outreach initiatives, including forums, media engagements and collaboration with academic institutions, the CAF can help demystify the technical aspects of BMD and highlight its importance for national security. Additionally, the CAF can emphasize Canada's existing support for BMD within the NATO framework, where it is recognized as a vital component of collective defence, and as a part of modern IAMD systems. By framing the discussion around the need for a robust, integrated defence strategy that includes BMD, the CAF can assist the government in making informed decisions that align with public interests, while respecting the democratic process and the established roles of military and civilian leadership.

The comparative analysis of the USN's BMD capabilities yields crucial insights which support advocating for harnessing the capabilities of the CSC. The Aegis-equipped ships in the USN's arsenal showcase the manoeuvrability, practicality and effectiveness of an integrated approach to BMD. The use of advanced AESA radars and versatile interceptors like the SM-3 and SM-6 highlights the centrality of having a comprehensive and adaptable system to counter diverse ballistic missile threats.

This insight reinforces the argument for the CSC project's BMD capabilities, which includes the Aegis system and

associated technologies. The CSC's integration of Aegis C2 systems, SPY-7 radar and the Mk 41 VLS aligns with the proven capabilities of the USN's BMD approach. By adopting a similar framework, Canada can use the CSC to establish a BMD capability, enhancing its contribution to NORAD missions and addressing evolving missile threats effectively. This comparative analysis supports the feasibility and strategic advantage in leveraging the CSC for bolstering Canada's air and missile defence capabilities.

Conclusion

This article has briefly traced past and present Canadian BMD policies, and proposed a strategic shift in defence posture through the CSC project. The primary objective of this shift is to strengthen Canada's security by significantly bolstering its role in North American defence, specifically addressing evolving missile threats. Additionally, possessing a credible BMD capability will serve as a valuable deterrent against hostile international actors posing a threat to global security. The analysis underscores the potential of the CSC project to facilitate this evolution; equipped with Aegis C2 systems, SPY-7 radar and the Mk 41 VLS, the CSCs would provide a credible BMD capability for Canada.

Keeping a CSC on a BMD patrol 24/7, 365 days a year would be both infeasible and impractical due to the significant strain it would place on limited naval resources, including personnel, maintenance and operational readiness. This class



Credit: Petty Officer 1st Class Cassandra Johnson, US Navy

US Navy students participate in the Aegis Tactical Action Officer training course in the Reconfigurable Combat Information Center Trainer at Naval Station Norfolk in summer 2024.




A CF-18 Hornet, F-35 Lightning II and F-16 Fighting Falcon intercept a Chinese H-6 in the Alaska Air Defense Identification Zone on 24 July 2024 during a NORAD mission. Canada's interception role in NORAD is limited to using air-to-air methods such as fighters.

of ships is designed to fulfill multiple roles and dedicating a single vessel on each coast exclusively to BMD would reduce the ship's availability for other critical missions, compromising overall fleet readiness, and thus the need for government flexibility. Moreover, such a continuous commitment would be unsustainable given the relatively small number of ships planned and the vast geographical area they would need to cover. However, BMD is not intended to be a standalone mission for the CSCs but rather a component of a comprehensive IAMD system. In this context, the ships can be leveraged to advance the policy discussion by presenting a complete technical solution for BMD, demonstrating that Canada has the capability to contribute meaningfully to BMD when required. This approach allows the CAF to participate in BMD operations as part of a broader, more adaptable defence strategy, rather than simply over-committing resources to an impractical, round-the-clock patrol model.

Recent shifts in Canadian policy towards BMD, evident in commitments to NATO's Strategic Concept and NORAD modernization, acknowledge the growing risk posed globally by ballistic missiles. However, a policy disconnect remains in Canada's differentiated approach to missile defence against cruise and ballistic missiles in North America.

Analyzing the USN's BMD capabilities provides a model for Canada to consider, emphasizing the effectiveness of Aegis-equipped ships in countering ballistic missile threats. The CSC project's selection of C2 architecture, sensors and BMD-compatible vertical launch systems presents the CAF with the opportunity to generate BMD

capabilities and advocate for a policy shift towards the integration of BMD into the broader defence strategy.

In the current geopolitical landscape and with the stated need for an improved approach to integrated air and missile defence, Canada has a pivotal opportunity to strengthen its national defence and significantly contribute to collective security. As Canada invests in NORAD modernization, incorporating BMD capabilities such as through the CSC should be a critical component, aligning with a commitment to safeguard Canadian interests and those of Canada's allies. 

Notes

- * Opinions expressed or implied in this article are those of the author, and do not necessarily represent the views of the Department of National Defence or the Canadian Armed Forces.
- 1. Note that since this article was written, the RCN has decided on a name for the class – the *River*-class. For simplicity, the article will continue to refer to the CSC.
- 2. David Dunlop, "A Potential Political Brawl over BMD Capabilities on Canada's CSC Type 26 Frigates?" *BroadSides*, *Canadian Naval Review*, 27 November 2023.
- 3. Government of Canada, Department of National Defence (DND), "Domestic and Continental Defence," 31 August 2023.
- 4. Katherine Ziesing, "Ballistic Missile Defence 101: An Introduction," *Australian Defence Magazine*, 4 June 2015.
- 5. *Ibid.*
- 6. William Mauldin and Thomas Grove, "US, UK Warships Shoot Down Houthi Barrage in Red Sea," *The Wall Street Journal*, 10 January 2024.
- 7. John Boyco, "Bomarc Missile Crisis," *The Canadian Encyclopedia*, 7 February 2006.
- 8. US Department of State, Bureau of Public Affairs, The Office of Electronic Information, "Strategic Defense Initiative (SDI), 1983," 1 May 2008.
- 9. Frank Harvey et al., "Canada and Ballistic Missile Defence," Canadian Global Affairs Institute, March 2014.
- 10. *Ibid.*
- 11. "Slim Majority Oppose Missile Defence: Poll," *CBC News*, *CBC News*, 4 November 2004.
- 12. Harvey et al., "Canada and Ballistic Missile Defence."
- 13. Testimony before House of Commons Standing Committee on Defence, "Evidence, Tuesday, 18 October 2022," *NDDN (44-1)*, No. 34, House of Commons of Canada.
- 14. DND, "Domestic and Continental Defence."
- 15. Canada, DND, *Strong, Secure, Engaged: Canada's Defence Policy*, June 2017.
- 16. Canada, DND, *Our North, Strong and Free: A Renewed Vision for Canada's Defence*, 8 April 2024.
- 17. DND, "Domestic and Continental Defence."
- 18. *Ibid.*
- 19. Ronald O'Rourke, "Navy Aegis Ballistic Missile Defense (BMD) Program: Background and Issues for Congress," Congressional Research Service, 20 December 2023. RL33745.
- 20. CSIS Missile Defense Project, "Aegis Ballistic Missile Defense," 4 August 2021.
- 21. *Ibid.*
- 22. *Ibid.*
- 23. O'Rourke, "Navy Aegis Ballistic Missile Defense (BMD) Program."
- 24. Mauldin and Grove, "US, UK Warships Shoot Down Houthi Barrage in Red Sea."
- 25. Defense Security Cooperation Agency, "Canada – AEGIS Combat System," 10 May 2021.
- 26. Dunlop, "A Potential Political Brawl over BMD Capabilities on Canada's CSC Type 26 Frigates?"
- 27. Vice-Admiral Angus Topsy, email "Ballistic Missile Defence," 4 February 2024.

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