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Key Findings and Recommendations

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CSIS INTERNATIONAL SECURITY PROGRAM

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Executive Summary

Russia is expanding its undersea operations as part of a broader strategy of coercion aimed at its neighbors, NATO, and the United States. Russia has a long history of emphasizing its maritime capabilities for the purpose of strategic signaling, including the use of targeted provocations. Suspected territorial incursions in the Baltic Sea and provocative patrols in the North Atlantic have caused alarm among NATO and partner nations, in part because they have underscored the extent to which NATO and regional partner antisubmarine warfare (ASW) capabilities have atrophied since the end of the Cold War.

The Russian Navy and its submarine force have remained somewhat insulated from the economic and personnel challenges impacting Russia's broader military modernization efforts. Moscow has demonstrated an unwavering commitment to the development and maintenance of its submarine-based strategic deterrent and has emphasized nonnuclear submarine capabilities, certain surface warfare capabilities, and long-range antiship missiles over carrier battle groups, for example. For this reason, Russian submarines are generally believed to be very capable vessels when properly maintained. In Northern Europe, the Russian Navy's use of submarines to signal presence, reach, and power achieves an effect that is disproportionate to the resources committed.

NATO and partner nations do not currently possess the ability to quickly counter the Russian undersea challenge in much of the North Atlantic and Baltic Sea. Declining capabilities are not only to blame, however; equally problematic is the lack of integration among relevant allies and partners. An effective ASW capability will take a federated approach that integrates national and NATO platforms, sensors, and personnel in a coordinated manner. This integrated capability needs to be undergirded by a coherent and cohesive doctrine and regularly exercised to build a true capability at both a national and alliance level.

Given competing priorities, tight defense budgets, and seam issues in the European defense community between NATO members and the vital partner countries of Sweden and Finland, organizational reforms paired with a federated approach to capability development and small posture adjustments are needed to begin rebuilding the U.S. and European ASW capability in Northern Europe.

1. ***Preparing Organizational Structures:*** Using exclusively NATO structures may fail to properly leverage partner capabilities and expertise. NATO–Nordic Defence Cooperation (NORDEFCO) cooperation may be able to serve a bridging function to drive interoperability and combined operational proficiency. An ASW-focused Center of Excellence could also usefully serve as a hub for research, planning, doctrine development, lessons learned, and rebuilding and integrating undersea warfare capabilities.
2. ***Upgrading Capabilities:*** In order to develop a system that is effective against new and emerging technologies, NATO and its partners need to build a multidomain, multiplatform ASW and maritime surveillance complex, ideally within a federated

construct, that prioritizes payloads over platforms. The specific recommendations contained in this report bring together different sensors and strike capabilities hosted on large and small, manned and unmanned space-based, aerial, surface, and subsurface platforms.

3. ***Enhancing Posture***: NATO can optimize its ASW posture to ensure that the right capabilities are in the right places at the right time by reopening Keflavik Naval Air Station in Iceland and encouraging Norway to reclaim and reopen its submarine support facility at Olavsvern.

The organizations, relationships, intelligence, and capabilities that once supported a robust ASW network in the North Atlantic and Baltic Sea no longer exist. Building a federated approach to countering the twenty-first-century challenge posed by Russian undersea assets in this region is a critical step in preventing Russian naval coercion against the United States, NATO, and key European partners.

Recommendations for Countering Russian Undersea Activity

NATO along with key regional partners, Sweden and Finland, must rebuild lapsed proficiency in integrated antisubmarine warfare in order to deter and, if necessary, counter Russian undersea activities across Northern Europe. This should be pursued through: (1) preparing organizational structures; (2) upgrading capabilities; and (3) enhancing posture. These steps will serve as the cornerstone for improving allied proficiency in the undersea domain. The long-term success of these efforts will ultimately depend on the alliance and its partners maintaining a unified political front in the face of Russian aggression, as Russia will exploit any fissures in European collective security.

Preparing Organizational Structures

Recommendation: Revise the Alliance Maritime Strategy (AMS).

NATO's existing AMS was published in 2011 and focuses on "over the horizon" maritime security concerns, such as piracy, that threaten commercial sea-lanes or freedom of navigation. It does not reflect the implications of a resurgent Russia or the role of maritime in defense and deterrence. The revised AMS should articulate a common view of the maritime challenge posed by Russia, with an emphasis on anti-access/area denial (A2AD) vulnerabilities and undersea warfare activity in the North Atlantic Ocean, Baltic Sea, and Mediterranean Sea. This document must also elevate the alliance's priority on ASW and emphasize cooperation with key non-NATO partners, such as Sweden and Finland, on issues of mutual concern.

Desired Effect: Balances the alliance's current emphasis on crisis management, partnerships, and maritime security with the role of maritime forces in collective defense and conventional war fighting.

Recommendation: Encourage NATO-NORDEFCO ASW cooperation and leverage bilateral relationships.

As discussed in the previous chapter, Sweden and Finland are key partners in meeting the present Russian undersea challenge. Using exclusively NATO structures may fail to properly leverage their capabilities and expertise. NATO-NORDEFCO cooperation may be able to serve a bridging function to drive interoperability and combined operational proficiency. The close bilateral military relationships that both nations have with key NATO allies should also be leveraged to advance ASW cooperation. These bilateral relationships can build combined

capabilities and proficiencies in the same way that NATO-NORDEFCO efforts may enable more unified military responses to global threats.

Desired Effect: Creates new avenues for furthering defense integration and better enables the participation of Swedish and Finnish partners.

Recommendation: Create an ASW NATO Center of Excellence (COE).

While the realities of undersea combat make tactical cooperation difficult, strategic and operational coordination can be the difference between success and failure in an ASW campaign. Success in this sphere may not be about calling the same plays, but rather about making sure everyone is working from the same game plan. An ASW-focused Center of Excellence for allies and partners would serve as a hub for research, planning, doctrine development, lessons learned, and rebuilding and integrating undersea warfare capabilities. This center should serve as a venue for the creation of a common NATO playbook, akin to the Maritime Tactical Signal and Maneuvering Book, for theater ASW operations. Such an effort could help drive understanding across NATO and with relevant partner nations. An ASW COE would work closely with NATO's existing Centre for Maritime Research and Experimentation (CMRE) in Italy, the COE for Operations in Confined and Shallow Waters in Germany, and the COE for Naval Mine Warfare in Belgium.

Desired Effect: Provides a venue for integration and enhancement of NATO and partner ASW capability.

Recommendation: Align the NATO framework nation concept with a refocused standing NATO maritime group.

The alliance should reshape and refocus at least one of the two standing NATO maritime groups (SNMG) on high-end naval war fighting, to include ASW. The force will require a combination of surface, subsurface, and aerial sensors. Synergies may be found with the existing NATO Mine Countermeasure Group 1. A nation highly competent and capable in ASW should act as the framework nation that integrates other relevant ASW nations—including Sweden and Finland. A deputy nation could alternate operational command of the group on a biannual basis. These nations could help steer area specific networking and sensor developments through their national processes and the NATO ASW COE.

Desired Effect: Aligns and enhances the SNMG structure to the present threat environment. Expands the framework nation concept to the maritime domain. Dramatically improves NATO's maritime posture and capabilities in the Baltic Sea and North Atlantic.

Recommendation: Institutionalize and further develop a unified submarine command, weapons, and tactics course.

The UK submarine pre-command school, colloquially known as "Perisher" due to its high standards and associated high failure rate, is attended by officers from several NATO nations. NATO should develop a short-form Perisher-style course for allies and partners, perhaps within the context of the ASW COE. Due to equipment differences, this course would not

supplant national training for commanders (especially for those representing more advanced undersea navies), but it will help promote integration among NATO navies; improve the ability of the NATO submarine force to operate in a combined manner; alleviate some of the burden of maintaining a robust training pipeline for nations with small submarine forces; and create a common baseline among those countries with more nascent capabilities. A unified pre-command course will also be important as the various NATO member state navies acquire new undersea warfare capabilities.

Desired Effect: Drives common understanding, tactical interoperability, and aids smaller nations in maintaining high-quality training for their submariners.

Recommendation: Improve information sharing to develop a common undersea operating picture.

One of the most potent attributes of Russia's undersea capabilities is the strategic ambiguity created by their submarine force. Many of the NATO and partner nations in Northern Europe already possess relevant ASW capabilities, however, they are not integrated to produce a common undersea operating picture. Developing allied and partner information-sharing capabilities will help lift the veil on Russia's undersea activities and decrease their coercive power. In order to achieve greater integration, NATO should develop a transmission agnostic, encrypted data standard for undersea sensing data. Data streams from static and mobile sensors could not only feed local assets but be relayed to a shore-based NATO fusion center, potentially colocated with the ASW COE and aligned with the ASW-focused SNMG, to provide analytic capability. For submarine operations, this should include maintaining synchronized charts of allied and partner submarine areas of operation.

Desired Effect: Decrease the strategic ambiguity created by Russian undersea capabilities. A common undersea operating picture can also help ensure the resiliency of undersea infrastructure. Minimize underwater incidents and deconflict ASW operations.

Recommendation: Increase NATO ASW training for allies and partners and integration of ASW activities into NATO exercises.

NATO and partner nations will have to demonstrate prowess in the undersea domain to achieve their collective security goals and deter Russia. Simply developing and maintaining disparate capabilities will not be sufficient. Instead capabilities will have to be regularly exercised and employed in a combined fashion as an unequivocal signal of intent, resolve, and commitment.

When looking at training and NATO exercises in particular, there are some that are specifically focused on rebuilding ASW competencies or incorporating ASW elements. In 2015, NATO conducted a major ASW exercise named Dynamic Mongoose that included contributions of submarines and surface vessels from many NATO nations and included Swedish submarines. This exercise allowed the Commander of Submarine Forces NATO to gain experience in integrated ASW activities. Exercises of this scale and scope need to be conducted on a regular basis with the focus of restoring deep water ASW capabilities and providing training for SSN-operating nations in littoral combat.

BALTOPS is a U.S.-sponsored annual exercise in the Baltic Sea that focuses on a wide range of maritime missions to include ASW. This exercise is generally viewed as a forum to drive systems and operational interoperability between a wide range of NATO and partner nations in this vital region. Due to the changing threat environment, recent BALTOPS have more heavily focused on developing ASW and amphibious warfare competencies. This exercise and the U.S. role therein will be vital for creating a theater ASW capability for the Baltic Sea.

Desired Effect: Increased readiness, interoperability, and deterrent value. Creates venues for building and maintaining staff and command expertise.

Upgrading Capabilities

NATO investment in ASW capabilities has fallen across the board as the capability seemed less compelling post-Cold War. Accordingly, past excellence in ASW platforms, payloads, and personnel has atrophied in NATO and partner navies. NATO nations must recapitalize their ASW capabilities to achieve the needed proficiency with integrated theater ASW. These investments will have to be made in coordination with NATO's Nordic partners and ideally take a broader federated approach that seeks to maximize cost-savings, effectiveness, and efficiency across participating nations. Groups of nations with similar requirements would map out clear procurement priorities and divisions of labor; establish a unified maintenance and training pipeline for specialized skills; engage in joint research and development; develop common standards; and emphasize interoperability. This method would seek to leverage common platforms or mission systems to achieve greater information sharing and enhanced ASW sensor coverage of key areas. A new ASW COE as recommended above could ostensibly be a driver and facilitator for a federated approach.

The CSIS study team acknowledges, however, that a federated approach to shipbuilding, in particular, is likely not feasible for many nations. Nations are highly protective of their national shipbuilding industries, viewing them as key national security and economic assets. The track record of past multinational shipbuilding efforts is relatively poor, though there are some exceptions. Regardless, other areas of ASW procurement and maintenance, especially MPAs and sensors, are ideal for a federated approach.

Recommendation: Create a mutlidomain, multiplatform antisubmarine warfare system and federate where possible.

During the first phases of the Cold War undersea competition, the United States gained a significant operational advantage from its undersea surveillance system. As submarines get progressively quieter, a wider array of sensors and platforms will need to be brought to bear in order to successfully track and, if necessary, engage an adversary's submarines. In order to develop a system that is effective against the threats of both today and tomorrow, NATO and its partners need to adopt a mutlidomain, multiplatform ASW and maritime surveillance complex that prioritizes payloads over platforms. This network will bring together different sensors hosted on large and small, manned and unmanned space-based, aerial, surface, and subsurface platforms. This complex will also include austere, deployable, and potentially disposable sensors that can be widely seeded across a potential battlespace.

Achieving this vision will be difficult given national sensitivities about data sharing in this domain. Some countries may also be unwilling to share data produced by national intelligence assets with their own tactical units. The United States faced this problem at certain points during the Cold War and it has the potential to again complicate efforts to achieve the clearest possible picture of the undersea domain. These efforts will also be hindered by the physical challenges of wirelessly transmitting large quantities of data from disparate sensors to centralized processing locations. Bandwidth limitations and national sensitivities surrounding encrypted communications are well understood within certain intelligence communities especially those that work with unmanned aircraft systems (UAS), but are not uniformly understood across the policy community.

Space Systems

The use of space based systems for ASW missions is not new. Overhead imaging has been used to track naval deployments to include submarines for at least two decades. Because of this fact, many nations have built covered bases for their submarine fleets to prevent or limit the ability of other nations to monitor their deployments from space.

Unclassified sources point to new uses for space-based monitoring systems for ASW. Such systems fall into a broader category of nonacoustic tracking of submerged vessels. These technologies generally include aerial- and space-based sensors, but almost all require the synthesis of multiple sensors in order to accurately track an adversary's submarine. This requires substantial processing and bandwidth to achieve. It is believed that the Soviet Union was investing in these technologies before the end of the Cold War. The present state of Russian research in this area is unclear to the CSIS study team. A breakthrough in this technology area could create a paradigm shift in undersea warfare.

Desired Effect: In the near term, space-based systems will provide some measure of warning before submarine deployment. In the long term, space-based systems could transform undersea warfare. Any such breakthrough is likely decades in the future, but the potentially disruptive nature of these future systems, along with potential Soviet/Russian research efforts in this sphere merit some amount of consideration.

Aerial Systems

This category encompasses a range of platforms from large MPAs based on commercial airliners to small UAS that can be launched by a single operator. Several European nations are looking to replace or renew their maritime patrol capability. As previously mentioned, the UK is acquiring several P-8 aircraft and the Norwegians may follow suit. Both Germany and France will likely to have replace their MPA fleets in the 2020s. While a common airframe is unlikely, common payloads could help defer some costs, streamline maintenance, and dramatically improve interoperability. These aerial platforms should have the capability to serve as aerial intelligence processing and dissemination hubs for a wide range of distributed sensors above, on, and below the sea.

NATO and partner nations should also consider how UAS could augment or perhaps replace traditional manned ASW assets. With their exceptionally long loiter times and potentially high

payloads, larger UAS seem to be ideal platforms for seeding a range of distributed undersea sensors on short notice. Such platforms could also serve as a networking hub for collecting data from these distributed sensors and transmitting it to a surface vessel or other central location of processing.

From an aerial sensors perspective, NATO and partners should look beyond advanced periscope detection radars and advanced sonobuoys (or sonobuoy-esque systems). Future aerial sensors could potentially include light detection and ranging (LIDAR) systems or advanced magnetic anomaly detectors. Advances in sensor technologies will likely enable smaller systems to be employed for ASW missions and therefore bringing these capabilities to a wider array of platforms. (For example, small patrol vessels less than 100 feet in length may be able to deploy with small ASW UAS, dramatically improving the capabilities of small navies such as in Lithuania, Latvia, and Estonia.)

Desired Effect: UAS have the potential to reshape the aerial ASW mission by creating an inherently networked solution, as well as bring ASW abilities to a wider range of platforms. Future sensors may also move away from the acoustic detection paradigm.

Surface Systems

Surface systems are often thought of as second class citizens when it comes to ASW missions. However, they play an important role in the broader ASW system. They can host a wide array of sensors, embark purpose-built ASW aircraft, and may serve as a floating processing, exploitation, and dissemination (PED) center for a variety of different sensors supporting a theater level ASW campaign.

Planned NATO investments in large surface vessels capable of performing the ASW mission and their respective sensors are likely sufficient to meet current and future threats. These vessels are often not used as the proverbial tip of the spear in ASW operations. That said, NATO and its partners should explore investments and experimentation with afloat PED systems to transform these surface ships into the “quarterbacks” of the ASW mission.

The use of unmanned surface vessels (USVs) is a potential growth area in these missions. An example of such a system is the Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) currently being tested by the U.S. Defense Advanced Research Projects Agency (DARPA). There are also a host of commercially available options in this space. Such platforms use their nontraditional designs (the result of not having a crew) to offer unique capabilities in the ASW mission. They are also tremendously difficult for adversaries to counter due to their low acoustic and optical profiles.

Desired Effect: Investments in afloat PED systems can help with the creation of a truly integrated multidomain, multiplatform ASW complex. USVs, like their cousins in other domains, may provide novel capabilities and significant capacity at lower costs than a comparable manned system. This increased capacity may be an operational necessity given advances in submarine quieting.

Subsurface Systems

As with the previous two categories, subsurface systems include both manned and unmanned platforms. Also similar is the time component to these developments, with manned platforms representing the current capabilities and advanced UUVs representing a future development goal. With regard to traditional submarines, NATO and partner nations should look to cooperate wherever possible on the development and construction of a new generation of AIP submarines. This collaboration should also include subsystems such as propulsion, sensors, and battle management equipment.

Joint acquisition efforts would allow nations to gain savings from economies of scale and shipyard proficiency. A potential issue for any collaborative effort stems from differing design requirements that result from major differences in operating environments. For example, nations that opt for small submarines operating for short durations in coastal areas will not be able to support long duration missions in distant waters.

In addition, all future submarines should use a modular design with regards to both sensors and combat weapon systems. This will be vital if submarines are to keep pace with rapidly evolving technologies, especially UUVs. Future submarines may serve as the mothership for a wide range of other systems operating above, on, or below the surface at various ranges.

NATO should develop an unmanned underwater vehicle capable of being launched from ship or submarine based on a commercially available system as a first step in acquiring operational proficiency with these systems. This UUV should be compliant with a NATO 533 mm torpedo tube and have a modular payload. A common NATO UUV would also have the ability for tele-operated or autonomous operations. Such a craft could be used as an additional ASW sensor and to monitor vital undersea infrastructure.

As a longer term R&D goal, NATO should consider how future large UUVs will be integrated into any theater level ASW system. These R&D efforts will have to tackle difficult questions such as undersea networking and power generation. The development and fielding of these systems will permit greater ASW coverage without large capital investments in manned systems. When teamed with other platforms, they can be used in concert to offset individual platform shortcomings. In the Baltic Sea, unmanned platforms can be key partner to advanced submarines as they can improve the ability to operate and sense in shallow, crowded littoral waters.

Subsurface capabilities also include distributed undersea sensors of both the disposable and permanent varieties. The most pressing need in this area is the development of a new family of systems to monitor key chokepoints in the North Atlantic and Baltic Sea. Oceanographic and topological conditions can either help or impair the coverage of distributed sensor networks. Due to the sensitivity surrounding these systems and the intelligence they produce, the development and fielding of any such system is likely limited to the United States, United Kingdom, Norway, and possibly a Nordic partner.

Desired Effect: These investments will replace aging and outdated platforms in the near- to mid-term and lay the foundation for a new generation of systems in the mid- to long-term.

The effective integration of UUVs will create a manned-unmanned teaming paradigm in the undersea domain and pave the way for a dramatic increase in the tracking capability and lethality of the entire system.

Data Processing and Intelligence Fusion

Sonar has remained the chief tool for tracking submarines since its inception. While the capability of automated systems has increased dramatically, they still fall short of a well-trained human sonar operator. This gap may prove difficult to completely overcome. Despite this, NATO and partner nations should direct investments that can automate portions of the acoustic intelligence exploitation process. These technologies can help limit bandwidth requirements for remote sensors and provide unmanned platforms the intelligence required to identify and track potential targets and, if necessary, cue additional platforms.

These investments will be necessary to leverage many of the systems previously described in this section. The amount of data that will be generated by increasing the number of unmanned systems will be more than can be currently processed. Onboard pre-processing will be a requirement for data transmission in bandwidth-limited environments, such as underwater, and may prove to be required for all systems given the explosive growth of data and finite nature of the wireless spectrum.

Desired Effect: These investments will reduce manpower requirements for undersea monitoring and improve the efficacy of remote, autonomous sensing platforms.

Recommendation: Integrate interoperable land attack weapons on all NATO and partner nations' submarines.

Several nations have been unwilling to integrate land attack cruise missiles into their naval force for political reasons. Given current gaps in precision guided munitions across allied surface and sub-surface fleets, NATO and Sweden should refit their submarine forces to be capable of employing Tomahawk (or equivalent) land attack weapons. Land attack capability should also be a key requirement for all future allied and partner submarines.

Desired Effect: Allows submarines to strike targets with less counterforce risk than land based systems. Powerful deterrent value.

Recommendation: Leverage rapidly deployable, nonmilitary government assets to improve undersea collection capabilities.

There is an impressive collection of militarily-relevant oceanographic survey capabilities owned directly by NATO or by individual NATO allies and partners. These vessels could be used as platforms for undersea intelligence collection. Often, they are optimized for acoustic collection with specially designed hulls, engines, and other equipment. During the Cold War, NATO's scientific committee used expertise in oceanography to gain an operationally-relevant edge over the Soviet Navy. As part of a modern effort to leverage these assets and skills, the U.S. Navy should consider supplying a Surveillance Towed Array Sensor System (SURTASS) to NATO's Centre for Maritime Research and Experimentation (CMRE). NATO

should also fund the installation of secured communications and signal processing equipment on appropriate vessels to ensure they can be successfully integrated into a maritime sensor network. Leveraging nonmilitary research vessels for military purposes may be considered politically sensitive among certain allies and partners.

Desired Effect: Increases the number of sensors available for the ASW mission in a novel and low cost manner. The high at sea time of these vessels can be leveraged in the ASW mission without disrupting the core scientific mission. In a crisis scenario, these nonmilitary vessels offer an interesting option for increasing situational awareness without necessarily increasing tensions.

Enhancing Posture

To maximize the impact of the recommended reinvestments in organization and capabilities described above, NATO should also consider some posture changes. This is an issue is largely restricted to the North Atlantic, as the enclosed geography and relatively small size of the Baltic Sea make any posture challenges negligible. The changes proposed below, while not substantial, will have an outsized impact in re-optimizing the alliance for ASW operations in the North Atlantic.

Recommendation: Encourage Norway to reclaim and reopen its submarine support facility at Olavsvern.

The former Royal Norwegian Navy base at Olavsvern is ideal for supporting submarine operations in the extreme North Atlantic and Arctic Seas. This facility was built to house the Norwegian submarine force in fully enclosed pens built into the side of fjord and is strategically located at the confluence of the Barents Sea and extreme North Atlantic. During the Cold War, NATO submarines used this strategically important base as a resupply hub when conducting long ASW patrols of the region. It was closed in 2009, a move that has been criticized by retired members of the Royal Norwegian Navy. This criticism intensified when the private investors who purchased the facility went on to lease it to Russian firms with links to Gazprom. These linkages have caused some angst among many in the security community both in Norway and abroad. While reopening the entire facility may be cost prohibitive, it may be possible for Norway to nationalize and reopen a portion of the facility to support rotational presence of U.S., UK, French, and Norwegian submarines. Such an arrangement may be particularly useful for the French as their SSN fleet is homeported in the Mediterranean.

Desired Effect: Offers NATO nations a secure facility from which to base patrols in the North Atlantic and Arctic with very limited transit times from homeport to station.

Recommendation: Reopen Keflavik as a support facility for rotational NATO and partner ASW activities.

As part of the fiscal year 2017 budget request, the Department of Defense intends to restart ASW aircraft patrols from the former Keflavik Naval Air Station in Iceland on a rotational basis. Keflavik was a key hub for NATO MPAs during the Cold War. Its proximity to the GIUK gap

meant that aircraft wasted little time in transit and could therefore patrol for much longer periods. The United States closed the base in the 2000s. While overall MPA capacity in Europe has significantly declined, NATO should consider ways in which allies could join the United States in Keflavik on a similar rotational basis. Any NATO footprint is likely to be small as Keflavik is also Iceland's primary international airport.

Desired Effect: Increases the patrol aircraft coverage of the GIUK gap by creating a nearby basing hub. Keflavik operations would be easily conducted in concert with existing MPA bases in the UK and Norway.

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