Cooperating With Russia on Missile Defense: A New Proposal

By Dean A. Wilkening

Russia has opposed U.S. ballistic missile defense plans for decades, and differences over that issue currently are a major irritant in U.S.-Russian relations. There have been numerous proposals for U.S.-Russian and NATO-Russian missile defense cooperation, but often they lack reciprocity and fail to significantly improve the security of all countries involved. This article's proposal for a joint NATO-Russian early-warning radar located in central Russia provides genuine security benefits for all countries, improves strategic stability, and involves potential industrial partnerships, which ought to be of interest to Russian semiconductor firms.

During the Cold War, Russian concerns about U.S. missile defense led to the signing of the Anti-Ballistic Missile (ABM) Treaty between the two countries in 1972. After President Ronald Reagan announced the Strategic Defense Initiative in 1983, Russia became concerned that this research program would violate the treaty. This concern subsided within the decade as U.S. enthusiasm for the more fanciful aspects of the program waned and Russian leaders became consumed with more pressing issues raised by the collapse of the Soviet Union. The administrations of George H.W. Bush and Bill Clinton continued to work on missile defense systems, albeit within the constraints of the ABM Treaty as they understood them.

However, in June 2002, the administration of George W. Bush withdrew from the ABM Treaty and in 2007 entered negotiations to deploy strategic missile defense interceptors in Poland and a large missile defense radar in the Czech Republic, collectively known as the “third site”—the first two sites for defense of the U.S. homeland being at Fort Greely in Alaska and Vandenberg Air Force Base in California. This plan drew bitter complaints from Russian leaders until the Obama administration abandoned it in September 2009 in favor of the European Phased Adaptive Approach—a four-phase plan to deploy interceptors in and around Europe starting with sea-based Standard Missile-3 (SM-3) Block IIA interceptors in 2011 and progressing to SM-3 Block IB interceptors at sea and on land at Deveselu, Romania, by 2015; SM-3 Block IIA interceptors on land in Poland and on ships around Europe by 2018; and finally SM-3 Block IIB interceptors at sea and on land in Europe by 2020. The latter two phases of this deployment schedule have again raised Russian concerns due to the alleged capability of these systems to intercept Russian strategic ballistic missiles, although Russia has not provided evidence that this is physically possible from the interceptor sites that would be used in those phases.[1] In response, the United States and NATO have tried to reassure Russia that the deployments under their phased adaptive approach do not have this capability and are not intended to undermine Russia’s deterrent.

To underscore this benign intention, the Obama administration has tried to engage Russia in various cooperative efforts on missile defense. In their June 24, 2010, joint statement on strategic stability, President Barack Obama and Russian President Dmitry Medvedev committed themselves to the goal of “continuing the development of a new strategic relationship based on mutual trust, openness, predictability, and cooperation.” Regarding missile defense, Russia has argued for legally binding assurances that the missiles deployed under the U.S.-NATO approach will not be aimed at them. The United States has rejected this idea, not least because any legally binding assurance that requires U.S. congressional consent would be extremely unlikely to receive such approval.

Instead, NATO has suggested various forms of cooperation with Russia with the goal of developing two independent missile defense systems, Russia’s and NATO’s, along with two joint command
centers that would facilitate the exchange of information with Russia. In addition, the United States and NATO have proposed joint missile defense exercises at command posts and in the field, along with further discussions regarding joint responses to common threats. The aim of cooperation would be to make any missile defense system in the Russian-European sphere more effective and to help alleviate Russian concerns that the European-based interceptors are targeted against them.

To be effective, NATO-Russian cooperation should meet several criteria. First, the undertaking should improve strategic stability or at least not undermine it, that is, cooperation should not reduce the effectiveness of U.S., NATO, or Russian strategic nuclear forces. Second, cooperation should involve reciprocity; it should genuinely enhance the security of all parties. Russia, for example, has argued that sharing data from its early-warning radars at Gabala, Azerbaijan, and Armavir, Russia, would benefit only NATO, with no tangible security benefits for Russia. Third, it is helpful if cooperation involves industrial partnerships because such cooperation creates constituencies within each country to keep cooperation alive despite political pressures that undermine it. Joint U.S.-Russian space-launch activities, which provide clear economic benefits to both parties, have demonstrated this over the past decade. Cooperation in the military sphere clearly is more sensitive because it does not involve commercial interests alone.

Cooperation, if it occurs, should begin with small steps to build trust, leading to more ambitious steps later. For example, an initial step that should be relatively easy to take would involve establishing a joint data fusion center along the lines of an earlier U.S.-Russian bilateral Joint Data Exchange Center established by a June 2000 memorandum of agreement between Clinton and Russian President Boris Yeltsin “for the exchange of information derived from each side’s missile launch warning systems on the launches of ballistic missiles and space launch vehicles.”[2] The data exchange center never became fully operational due to political and legal wrangling over its implementation. In any case, the 10-year memorandum now has expired, but Medvedev and Obama raised the issue of cooperation on a new fusion center at their June 2010 summit. NATO Secretary-General Anders Fogh Rasmussen reiterated the suggestion later the same month.

Such a center would involve NATO countries as well as Russia; would involve the exchange of information on any missile launch, not just launches by the member parties; and eventually could involve the exchange of information on missile interceptor launches. This last feature would help coordinate defensive actions between NATO and Russian missile defense systems in addition to identifying likely intercept debris impact zones—areas on the ground where debris from the intercept might land—thus helping countries limit collateral damage.

Perhaps the most important role for a fusion center would be to help avoid unwanted escalation that easily could arise from misunderstandings or misperceptions in the wake of an accidental or unauthorized ballistic missile launch by any member state or hostile power or of an intentional interceptor launch that heads toward the territory of another party. Regardless of its merits, agreement on establishing a fusion center has yet to materialize, which demonstrates the political difficulty of arriving at a consensus on missile defense cooperation in the near future.

Another idea, originally suggested in the 1990s, is technical cooperation involving space-based infrared satellites for environmental monitoring and defense applications (e.g., providing early warning of ballistic missile launches). In the 1990s, after the collapse of the Soviet Union, Russia’s early-warning satellite capability deteriorated significantly.[3] Having reliable ballistic missile warning systems promotes strategic stability by reducing the fear of surprise attacks.

In 1997, Clinton and Yeltsin agreed to cooperate on the Russian-American Observation Satellite experiment, a joint space research program using one Russian satellite and one U.S. satellite for simultaneous stereo-optical imaging of the earth.[4] This program ran into various forms of political opposition and financial “restructuring” on the U.S. side. Ultimately it died when the United States withdrew from the ABM Treaty in 2002.[5]

As noted above, another form of cooperation, also discussed in the 1990s, is joint missile defense exercises at command posts and in the field. These exercises shed light on, among other things, the rules of engagement for missile defense operations and hence help avoid confusion in the event that NATO or Russian missile defense systems attempt to intercept a hostile ballistic missile launch.
All of these examples of cooperation are worth exploring in the next few years. This article describes a more ambitious form of cooperation that would improve strategic stability, has reciprocal security benefits for all countries involved, and involves an interesting element of industrial cooperation. Given the pace of cooperative efforts to date, however, this option probably cannot be realized in the near future. The basic idea is that NATO and Russia would jointly develop and deploy an upgraded early-warning radar. Similar in design to the ones the United States operates for homeland defense, this one would be deployed in central Russia.

**Early-Warning Radar Systems**

Over the past decade, the United States has upgraded its early-warning radar network consisting of Ballistic Missile Early Warning System radars at Fylingdales, England, and Thule, Greenland, and PAVE PAWS radars at Beale Air Force Base in California and Clear Air Force Station in Alaska. (The PAVE PAWS radar at Cape Cod Air Force Station in Massachusetts has yet to be upgraded.)

The radar upgrades include improvements in tracking and object classification for ballistic missile defense, which at the same time strengthen attack-warning and attack-assessment capability. Space surveillance is a secondary mission. The radars operate in the UHF radar band (at approximately 435 megahertz); have multiple faces, each of which can track objects close to the zenith and covers an azimuth sector of 120 degrees; and can track objects to a range of approximately 4,800 kilometers. Apparently, the track accuracy from these radars is good enough to provide a “fire control solution” for ground-based interceptors located at Fort Greely and Vandenberg Air Force Base, i.e., they can predict the intercept point sufficiently accurately that a ground-based interceptor has a reasonable chance of successfully homing in on the target.[6]

Russia has a similar early-warning radar network, but it has undergone some deterioration following the breakup of the Soviet Union, in part because of a lack of funds and in part because some of these radars were located outside Russian territory. The Russian/Soviet early-warning radar network generally operates at lower frequencies in the VHF band and currently consists of Daryal (Pechora), Volga, Voronezh-M, and Voronezh-DM radars.[7] All of these radars have the capability to track targets above the horizon in addition to their surveillance function, unlike some of the older Russian Dnepr/Dnestr (Hen House) radars. The latest Voronezh-DM radar, recently installed near Armavir, probably operates at the higher end of the VHF band (approximately 240 megahertz, judging from the antenna spacing on photographs of the radar face).

**A Joint Radar in Central Russia**

A jointly constructed and operated radar in central Russia, similar in design to the upgraded early-warning radars in the United States, would consist of three active-array faces operating in the UHF radar band at approximately 435 megahertz using UHF solid-state transmit/receive modules. The technology for the modules would be based either on silicon power transistors (1970s technology) or high-power laterally diffused metal oxide semiconductors (state-of-the-art technology), the latter of which is available commercially for applications in cellphones and high-definition television transmission networks.[8] The United States would provide the initial transmit/receive modules to populate the radar because it currently has the production capacity, while Russia would build the replacement modules based on technology the United States would transfer to Russia. Technology transfer of this sort is always a sensitive issue, but it should be less so in this case because the relevant technology already is commercially available on the international market. Moreover, while laterally diffused metal oxide semiconductors offer higher power than silicon transistors, this type of semiconductor cannot be used for radar applications greater than S-band due to inherent limitations of the semiconductor material. Therefore, this technology cannot be reverse engineered to develop the most sensitive U.S. radar technology, X-band transmit/receive modules, used in the most advanced U.S. missile defense tracking radars.[9]

After construction is complete, there is no need to have NATO personnel permanently stationed at the radar site because the raw radar data would be sent via fiber optic cable to two independent processing centers, one in Europe and the other in Moscow, where the raw data would be processed according to algorithms designed separately by each party. This would keep sensitive information...
regarding signal processing algorithms in the hands of national governments, thus avoiding sensitive technology transfer issues. Russia would have complete control of site security once the radar was operational. A three-face upgraded radar would cost approximately $500 million—a very rough estimate derived from the $260 million cost to upgrade the dual-face Thule radar.[10] Presumably this cost would be shared, with Russia paying more for site construction and NATO paying more for the radar equipment.

Benefits and Risks for Russia

The radar would provide several benefits for Russia. First, it would plug the gap in early-warning radar coverage to the east, a gap that a new Voronezh-DM early-warning radar planned for Mishelevka also would fill. However, an upgraded radar of the type described here would operate at nearly twice the frequency of the Voronezh-DM radar and consequently would provide more-accurate attack warning and attack assessment information to Russian military and political leaders. In fact, this radar could become the backbone of a future Russian national ballistic missile defense system by providing more-accurate and near-continuous (due to the three faces) tracking data with which to commit interceptors from the Moscow A-135 missile defense system and possibly the S-400 and S-500 theater missile defense systems. Finally, by transferring technology for laterally diffused metal oxide semiconductors, this proposal would involve industrial cooperation that should be attractive to Russian semiconductor industries interested in commercial spinoffs in the cellphone and television markets.

At the strategic level, a joint upgraded radar would improve strategic stability by providing Russian leaders with more-accurate information regarding incoming ballistic missile attacks, thereby making their command and control system more reliable. It would also contribute to the survival of Russia’s strategic nuclear forces by providing reliable tactical warning for dispersing mobile assets, providing track data to missile defense systems that can defend these assets, or both. Importantly, this radar cannot improve the effectiveness of the U.S. Ground-Based Midcourse Defense (GMD) system against a Russian ballistic missile attack because Russia, having physical control of the site, could easily shut down or physically disable the site prior to any Russian ballistic missile launch. In addition, blackout periods would be allowed to prevent the radar from collecting potentially sensitive data on Russian ballistic missile flight tests that pass through the radar’s fans. Finally, because early-warning radars of this type have space surveillance as a secondary mission, this radar could become a key asset for NATO-Russian cooperation on space situational awareness.

Benefits and Risks for U.S., NATO

The United States and NATO would benefit from having access to these radar data. In the U.S. case, no radar can provide early track information on hypothetical Iranian intercontinental ballistic missiles (ICBMs) heading toward the United States because these ICBMs fly over central Russia. The current U.S. early-warning radar network detects these trajectories much later than would a radar located in central Russia, especially for tracks heading toward the U.S. West Coast, Alaska, or Hawaii. The forward-based X-band radar located at Kurecik, Turkey, would be the first radar to detect an Iranian ICBM on these trajectories, but it cannot track the target for long before the missile leaves its radar coverage.

Early track data from the east face of the Voronezh-DM radar at Armavir could provide tracking times comparable to those from the south face of a joint radar at Yekaterinburg, but it is not clear whether Russia would share these data with the United States in real time or whether the track data from this VHF radar are accurate enough to launch ground-based interceptors from Fort Greely. The south face of a joint upgraded early-warning radar in central Russia would provide good track data on the ascent portion of Iranian ICBM trajectories, while the northwest and northeast faces would provide good track data on the middle portion of these trajectories.

Early track data are important because they provide more time for the U.S. GMD system to conduct multiple intercept attempts. This is reflected in larger shoot-look-shoot coverage afforded with an upgraded radar located in central Russia.[11]

The utility of this joint radar to the United States would be diminished if the United States deployed
infrared missile-tracking satellites that can track Iranian ICBMs early in their flight. The United States recently deployed two prototype Space Surveillance and Tracking System satellites, derived from the earlier Space-Based Infrared System-Low Earth Orbit satellite program. The U.S. Missile Defense Agency plans to deploy a less expensive satellite constellation, called the Precision Tracking Space System, by fiscal year 2017. Thus, if all goes well—a significant qualifier, given that the programs to develop missile tracking satellites have suffered from repeated program delays and cost overruns in the past—the United States will have the capability to track Iranian ICBMs shortly after liftoff in the 2020 time frame. In this case, a joint upgraded radar would provide a redundant means for tracking Iranian ICBMs early in their flight. Moreover, this radar could be operational before 2020 if NATO and Russia take cooperation seriously.

In summary, a joint upgraded early-warning radar located in central Russia would improve the performance of the U.S. GMD system against Iranian ICBMs, but not against Russian ICBMs. A radar in that location would not help track North Korean ICBMs because they tend to fly below the radar horizon. Besides, North Korean ICBMs already could be tracked quite early by the existing forward-based X-band radar at Shariki, Japan, and the Cobra Dane radar on the Aleutian Islands.

The main obstacle to cooperation for the United States would be obtaining International Traffic in Arms Regulations (ITAR) exemptions to allow UHF transmit/receive module technology to be transferred to Russia. ITAR exemptions often are difficult to obtain for joint projects with U.S. allies, even though granting this exemption should not be a problem because the technology already is in the commercial domain. Perhaps the greatest risk for the United States is that a joint upgraded radar under Russian physical control gives Russia a partial veto over the effectiveness of the U.S. GMD system against Iran because the system could be degraded somewhat if Russia blocked U.S. access to data from the joint radar during an Iranian ICBM attack, although such an act would cause a serious U.S. backlash against Russia. In addition, the effectiveness of U.S. midcourse defense systems under this scenario would be no less than if a joint radar had not been built in the first place.

Europe would benefit from a joint upgraded early-warning radar in central Russia because no European sensor currently can track the trajectories of ballistic missiles heading toward Europe from the east. In this regard, a joint radar fills a gap in European early-warning coverage just as it does for Russia, and it would improve the effectiveness of the European missile defense architecture, as planned under the phased adaptive approach, against attacks emanating from the east. As noted above, such a joint radar would provide the basis for cooperation on space situational awareness.

Perhaps the biggest drawback to this proposal is the likely reaction from China. From a Chinese worst-case perspective, the radar could be used to improve Russian and European defenses against the Chinese strategic ballistic missile arsenal. Even if this were not the intent, it would be perceived as such by Chinese leaders worried about “encirclement.” However, such a radar would not contribute to the ability to track Chinese ballistic missiles headed toward the United States because these trajectories generally are below the radar horizon for an early-warning radar located in central Russia. It is beyond the scope of this article to examine ways to minimize the impact on China, but such issues should be addressed if a joint NATO-Russian radar located in central Russia ever went forward. Asking China to join the project might be one option, but it is difficult to see what China would gain because ballistic missiles that India or the United States might launch at China are not likely to pass through this radar’s fans, and Russia presumably would block the transmission of data warning of attacks by Russian ballistic missiles.

**Conclusion**

A jointly constructed and operated upgraded early-warning radar located in central Russia would be an attractive form of missile defense cooperation between NATO and Russia because it would enhance strategic stability; provide reciprocal security benefits for the United States, Europe, and Russia; and potentially involve industrial cooperation of a sort that could help build trust and a true sense of shared interest in the development of effective missile defense systems to protect against the proliferation of long-range ballistic missiles. In short, it satisfies all of the criteria for successful missile defense cooperation with Russia. The biggest obstacles to implementing such a project would be political, specifically, export control restrictions in the United States and opposition in Russia to
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NATO facilities on its soil, even if Moscow had physical control of the facility after its completion and no NATO troops were stationed permanently in Russia. Minimizing adverse reactions by China could be a difficult challenge.

Clearly, this proposal for the radar is more ambitious than other near-term steps that might be taken, such as establishing a data fusion center or conducting joint missile defense exercises. A proposal such as this one, however, eventually would offer more-substantial security benefits to all parties involved and would signal a clear sea change in relations between Russia and the United States and NATO that goes well beyond the “reset” in U.S.-Russian relations envisioned by the Obama administration.

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ENDNOTES

1. For more detail on the lack of a technical basis for Russia’s concern, see Dean A. Wilkening, “Does Missile Defense in Europe Threaten Russia?” Survival, Vol. 54, No. 1 (February-March 2012), pp. 31-52.


9. Radar frequency is categorized by “bands” with, for example, L-, S-, C-, and X-band referring to frequencies in the ranges of 1-2, 2-4, 4-8, and 8-12 megahertz, respectively. The higher the frequency, the more accurate radar measurements become for a given antenna size, which is why X-band radar is particularly attractive for ballistic missile tracking.

11. Shoot-look-shoot coverage is defined as the area on the ground that can be defended by two interceptor shots, in which the second interceptor is launched only if the first interceptor misses the target.


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