

110217 Missile Defense Advocacy Alliance (MDAA) Capitol Hill Briefing on “Boost Phase Missile Defense,” with Representative Duncan Hunter, R-Calif.; Rear Admiral Jon Hill, Deputy Director of the Missile Defense Agency; Tom Lawhead, Chief of Staff of the Air Force Joint Strike Fighter Integration Office; and Riki Ellison, Founder and Chairman of the MDAA

MR. RIKI ELLISON: Good morning, everyone. My name is Riki Ellison, I’m the founder of the Missile Defense Advocacy Alliance, a group that I founded in 2003 right after our country withdrew from the ABM Treaty. I’ve been involved in missile defense since 1980, and had some interactions with Dr. Teller and Phil Graham.

We’re very active in the world. We’ve advocated for missile defense in 47 countries and all 50 of our states. We’ve been to 450 missile defense sites and platforms, and we are all about education on this topic, this group of systems, because we believe missile defense make the world a safer place.

Today, with the events we’re seeing in Asia around North Korea, the demand for missile defense is the highest it has ever been, and we have capability to defend populations in the Republic of Korea and Japan and in Guam and all 50 of our United States. So today we are taking an opportunity to look into the boost phase of missile defense capabilities. Today, with our mid-course phases and terminal phases deployed, I think it’s a serious opportunity for our government and the Department of Defense to take a very serious look at systems within the first few seconds that a ballistic missile takes off and before it starts dispersing its warheads (and chaff ?) and decoys. We have an opportunity to take that on in the first few hundred seconds.

The first 90 of those seconds are inside the atmosphere, and we obviously have platforms inside the atmosphere that may have capability to do that. So today we’re fortunate to have three speakers, representatives, and we want to give them an opportunity to address your questions and provide an understanding of this issue.

Our first speaker today is in charge of the F-35 integration for the United States Air Force. He is a former pilot. Please welcome Tom Lawhead.

MR. TOM LAWHEAD: Thanks, Riki, I appreciate it. It still pains me to hear, former pilot. I’ll get over that someday.

When I first got the invitation to chat this morning about the F-35 and boost phase missile defense, I scratched my head for a couple of minutes and talked with some friends up at Northrop who made the distributed aperture system for the F-35, which in itself is a great system. So I’ll take a couple of seconds to talk about the (DAS ?) itself, what it’s capable of doing and the potential applications for missile defense.

The DAS is mid-way (bi-AR ?) 360 degrees, six cameras on the F-35 is the application that we’re using, which knitted together create an all around the aircraft IR

view of the world. So there's multiple applications in how we're currently using it. One thing that Northrop Grumman has looked at is boost phase detect and track as well.

That stemmed out of a need in the program, a requirement in the program, for rocket and artillery detect so that we could integrate defensive countermeasure in the aircraft against those capabilities. Northrop did some follow-on ARAD (ph) work, taking it out into the boost phase detect for ballistic missiles.

So they actually did an exercise about three years ago, in October of 2014, with a DAZ (ph) Link 16 capability on the ground in Hawaii, a missile, an actual launch, and then their avionics test-bed airborne also with a DAZ (ph). They were able to detect a launch and cue that data via Link 16 to the airborne asset, which then used that data to start the track for missile and boost phase. It was then able to generate weapons quality track information and exhibited the capability to send a Link 16 J3.6 message which would have been capable and accurate enough for an Aegis cruiser to use.

So that's the great news. It's both a potentially fearsome discussion and exploration of actually using it in the F-35. The probably not so good news is right now it's not a part of the current program of record for the F-35. Certainly it would require integration and some time. I think Northrop's estimates would be from start to integration, probably in the three year timeframe.

There's still some hurdles to work over. Realize that that exercise had a ground-based distributed aperture system near the launch site which was able to detect launch. Theoretically you could detect launch airborne, and they've done some studies and tests on that. But those certainly have to be rounded out.

So then if you extrapolate into the future what you could potentially do with the F-35 and how you would operationally use it, because of the 360 degree nature of the distributed aperture system, you don't always have to be pointed at the potential launch locations. So it's fairly easy at that point to detect launch, start to track a missile, and you pass that off to other shooters. I would say that at the tactical unit level, a couple of problems would have to be overcome.

Really from an air tasking order, where do you set up caps? How long do you set up those caps for what your strategic (war indication ?) is? If it's time to set those caps and what phase of the conflict are you in?

And then really at the squadron level, what is the training plan? So missile defense isn't currently part of the F-35 primary mission, so you would have to add that to the squadron's missions and they would have to train to that capability. Granted, it's probably not a huge training burden, but it would take away from other missions.

The CFAC in the AOR, would also have to make a decision to have F-35s in the CAP looking for missile launches vice going into the country of choice to actually perform some of that deep strike missions that really is the bread and butter for the F-35.

So it's an interesting play-off. Do you use that capability in more of a standoff role, in a defensive role, or are you able to do that and then move forward into a strike role, perhaps even at that point of impact?

The other interesting piece that came out of Northrop Grumman's involvement in that exercise was actual point of launch and point of impact estimates that were fairly close. You could potentially determine point of launch and then go after that with either the same assets that were close enough, (or other assets ?). So a lot of interesting questions were raised and there's still some work to be done to actually bring anything to fruition. Just add money, there's a lot of potential (to be able to produce that ?).

MR. ELLISON: Thanks, Tom. The Missile Defense Agency has done some testing of systems over the last decade to prove out some of these technologies. We've done the -- (inaudible) -- for early SAT, for an SMC (ph) capability. We did an NCAD (ph) in the F-15 ARAD (ph) capability, and airborne laser, chemical laser on a 747. None of those programs are programs of record. But the technology has improved from those first (trials ?).

So then we have the integrator, and probably the best in the world, certainly the Russians, to take the mission and all the best resources across this country from the laps of the services, to look at applications to be able to use all those applications to effectively put forward a system or systems for boost-phase technology, to develop that. There's no program of record today for a boost-phase capability, but there is research going forward on that. So today we're very honored to have the deputy director of the Missile Defense Agency, Rear Admiral Jon Hill.

ADM. JON HILL: Thank you, Riki. I think my microphone is on? Alright.

First of all, I'd like to thank Riki for having us here today. I've known Riki for a long time. No one has got a bigger heart than Riki, but when you actually get past his great personality and his love for war fighters -- he's always honoring our sailors, our airmen, marines and soldiers -- it's something that we really value. So, Riki, thank you for all that you do.

He also confessed this morning that he's a grandfather, so his call sign is now grand poohbah. I'm sitting next to call sign vulture, in case you didn't know. I'm a (officer ?), so I have no call sign. I have an afterhours call sign, but I'm not going to talk about.

(Laughter).

So thanks for having me here. Lieutenant General Greaves, my boss, sends his regards. He would probably start off this conversation talking about the threat. That's always where he starts because that really does set the requirement. Riki kind of talked about the threat, Vulture talked about it a little bit, and what we're really trying to go after here is the early phase of flight.

I'm going to start off by just talking about the mission of the Missile Defense Agency. It starts with deploying that layered defense capability. Depending on where you're at, sometimes you think only of Patriot or THAAD or Aegis or Ground-Based Missile Defense. That's a layered system, purposely layered, so that we can take on ballistic missiles in all phases of flight.

So within our own mission statement of providing that layered defense in all phases of flight to protect our homeland and protect our allies and our friends, implicit in there is getting to the hardest phase of flight, which is boost phase. It's a tough one. So I'm going to talk about that here in just a little bit, but I'm going to weave it into the priorities of the director.

First let me say hello to the congressman. It's good to see you here.

From a (primary ?) perspective, if you were to ask General Greaves what he's worried about, he'll tell you number one it's about reliability, building reliability to build confidence in the war fighter. So our systems that are deployed today are in-service systems. It's not just about missiles, it's about the detect, control and engage sequence. So it's our sensors, it's our command and control, and it is our interceptors.

So building that reliability so that our war fighters are confident in what they have, I will tell you that they are confident, we are confident, we're dealing with today's threats. We're very confident that we could take that on.

The concern that we have, and you can ask General Greaves what keeps him up at night, or what keeps me up at night and possibly all of us here at the table, is what's happening tomorrow. What is the projection of that threat? Where is it going? Are the investments in the right place today? That's kind of where I'm going to drop anchor when we get to the boost phase here in just a bit.

The second part is capability and capacity. I'll emphasize again that capability and capacity is not just about the interceptor. Interceptors don't launch on their own. You have to see what you're going after. So the sensor architecture is critical to what we do, whether it is terrestrial based radars, radars on ships, sensors in space and in the atmosphere. They're very important for what we do.

But the control systems, that's where all the magic occurs. Someone asked me recently about innovation. I'll always talk about what our government labs, our industry partners do when they sit down in the dark room and work on the algorithms for control of the system, because that's where the magic occurs. That's what extends the capability of a great sensor and extends the capability of a great interceptor. So capability and capacity is across the whole detect, control and engage sequence.

And then the last part, the third -- I like to think in threes so I can remember them -- is going after the advanced threat. If you think about where the projections are going

and what we're going to see tomorrow, which is why we're worried about where things are going, that threat gets more complex. Someone mentioned to me before we started, what happens if they throw a barrage at you? Well the barrage and the (range ?) thing has always been an issue. Doing ICBMs or the range is probably not the issue for today, but is definitely an issue for tomorrow as they continue to build out their inventories.

We had a multi-national conference last week in Boston. I had the honor to sit down not only with industry from the U.S., but to talk to people from different areas of the country. I'll tell you, it's the first time in an international engagement where we all had a common problem. I will tell you that it doesn't matter if you're in the Pacific or if you're in the Middle East or if you're in Europe, you are worried about having a target on your forehead. That changes the way we do business. It kind of really just changes the thinking.

So when Riki talks about the importance of going after that early phase in the first 300 seconds, it's an important piece for us to go after. We're very good at going after the midcourse. If you understand how ballistic missile defense works, there's the boost phase, there's the ascent, you get to apogee, it's a parabolic kind of track, if you believe in a simple threat. Then it comes back into the atmosphere and you deal with it in the terminal phase. That's what I call the Hail Mary phase.

So you've got to deal with it. We're very good at midcourse. We're very good at terminal, and we have to go after boost phase.

Why is boost phase so hard and why are we interested? We're interested because we need to change the cost curve. We're well aware of the cost of the systems that we have deployed around the globe today. We know they're expensive. How do you get to that?

Well, you start to look at things like directed energy. There's great promise in directed energy. If you're as frustrated as I am that we're not going as fast as we could, it's because we really need to invest in that area.

Specifically for us, it's all about scaling. It's about scaling up the power. Why do we care about power? Well, if you're going to go after a boosting missile, you don't want to be flying over enemy territory. You don't want to be in the range of the air defense batteries. You want to have standoff range.

Power gives you that standoff range. In our case, most of the agencies, most of the services, have unique applications for directed energy. Back to my Navy days, we had lasers on ships.

Why did we do that, before we had the power that we really wanted to have? Because we wanted to learn how to operate it. We wanted our sailors to get comfortable with something other than hard-kill. We got used to electronic warfare and dealing with the hard-kill systems, but hitting them with an optical system was totally different and we

learned a lot.

Riki mentioned some experiments that we did in the past. You may remember the Airborne Laser. We learned a lot about high altitude flying and shooting down boosting missiles, and it's not easy. The ConOps are really difficult.

First of all, and I think the Vulture was kind of getting into this, you almost have to have exquisite intelligence and indications and warning. You've got to know where these launch sites are and where they're going to occur, so that you can have your sensors and your weapons in place to deal with boost phase. That is hard. That is not easy.

So we're working on the technical side in the Missile Defense Agency. Our combatant commanders and services are thinking through all the issues that occur, whether it's the first launch -- because it does matter where you're at -- or if it's after the first launch, the actions you take might be different. That's really an operational question that the forces are handling today. But if we can produce the technology, understand it, put the investments in it, and determine whether it's feasible to get to a higher powered laser at a weight that can be carried by a long endurance aircraft, then we have an option that we can provide to war fighters. That's really where we're focusing our time, is getting there.

So before I turn it over to the congressman, I'm just going to go back to the importance of the overall kill chain. I want you to think about intelligence, indications and warning. It's very important for boost phase. You've got to understand where it's coming from so that you can place your sensors and assets in the right place. The detection of our sensors -- we do this all the time. Every test that we do we bring out every sensor that we've got and we put it on that target, to include unmanned vehicles with optical sensors. So we're learning today, we're capturing the data, as Riki said. It's not a perfect record, but I will tell you that the investment in technology, we're working that and we are collecting data and characterizing it, how we would operate as we scale that power up and get ourselves into a high altitude aircraft.

And then you come to the command and control. Command and control is absolutely critical. This is where you task your sensors. This is where you do track management. This is where you initialize the weapon. This is when you launch the weapon. You determine the earliest time of launch, the latest time of launch. It's a critical piece often forgotten. I'm a systems guy so I like to talk about it.

And then your interceptor, absolutely critical to have (it get where it's going?). It has got know where it's going or else it's going to have to really pull some hard g's to get to the target. So all of that full systems thinking is what we're thinking about as we get into boost phase intercept.

Thanks for having me here, Riki. Again, congratulations on being a granddad. I love it. It's great.

MR. ELLISON: Our next guest is Congressman Duncan Hunter from California. He has served three terms -- (off mic) -- he is one of our emerging leaders in the United States Congress on boost phase, and a leader on educating congressional members on this issue.

REP. DUNCAN HUNTER: Riki, thank you very much. I'm not going to talk about only directed energy. Anything that can hit something going up in the air, I'm for it.

Iran and North Korea have the same type of what's called (geography?). Iran has got to launch northwest to get to Europe. Kuwait is a great place to shoot down boost phase for Iran missiles. North Korea is only 150 miles wide.

So what we're talking about here doesn't work anywhere else until we get to that point, to another country that's like North Korea or Iran. North Korea is only 150 miles wide. That's why boost phase works in North Korea.

Very simply, what we're trying to do is shoot AMRAAMs off F-35 in the first 300 seconds that it takes a missile to go up in the air. I'm working with guys at Los Alamos and Livermore. What I've come up to is a brick wall called the Missile Defense Agency and other organization within the U.S. government.

They want to do Navy ship directed energy. The Navy happens to like that one. The Air Force happens to like airplanes to use directed energy. They haven't done it yet, but we're close, my friends. We're only \$10 billion away and two years from getting it right.

The Navy wants to do ship directed energy. We're going to have that at some point. We're going to have rail-guns like we do on Navy ships now.

The Air Force wants to do directed energy on airships. What we want to do is shoot down missiles as they go up. By not containing North Korea, by shooting down missiles that are on the ground or going up, where are we going to get them?

We're within the same category, policy-wise at the highest level, as Russia. When they improvise and you have one missile pop off five warheads, you don't know which one is real. You don't know which ones are fake.

That's where we have mutually assured destruction with Russia. We don't talk about shooting down Russian missiles. You have mutually assured destruction. You shoot at us, we'll shoot at you, we're all dead.

China is like that too. We don't talk about shooting down Chinese ICBMs. You shoot at us, we shoot at you, and we're all dead.

We're going to let North Korea get in that category of okay, now that you have

them, you have too many for us to shoot down. You shoot at us, we shoot at you, and we're all dead. The point of boost phase shoot down is to contain North Korea, specifically in this case, so that we don't get to that point, so that you stay in that conventional warfare category and you don't go into the nuclear warfare category.

But if I cut them off at the legs -- and we're going to do it -- if I cut off North Korea at the legs and make them basically fall down on Kim Jong-un's head, as General Hyten puts it, we really discourage them from even testing, let alone shooting missile at people and even testing them. So here's what's easy about this. I've got a little map for this. It's all open source based on things you can get off of Jane's.

There's guys at Lawrence Livermore and Los Alamos who came to me and said we have to figure out -- and we have a map -- you can use an F-35 AMRAAM to shoot down boost phase missiles. It's that simple. The ICBM coming up, whether they have cloud cover or not, it's like an act of God. An ICBM shooting off in space is like an act of God in space.

You can see it from anywhere. You could be half way around the globe and a satellite could still see an ICBM taking off. You know that they're shooting.

North Korea won't shoot west because they can't hit us if it goes west. They've got to shoot east, northeast. So we're not going to be chasing the missiles either.

The people at MDA with Ph. Ds are very smart. We're not chasing missiles either. We know where they're shooting. We know where their trajectory is.

I just want to make sure here early this morning that you understand the way the trajectory works. You can shoot down missiles coming out of North Korea in the (inter-space ?) with (caps ?) of F-35s and AMRAAMs, and I've got a map to show it. That's why I'm here talking this morning.

That's what we should be doing. One reason we're not doing it is because it's not a billion dollar program -- billions of dollars program. That's one reason no one is interested, because you don't need anything else. You have F-35s, you have AMRAAMs, and you can shoot these things down as they go up, but you've got to do it now, as in today.

The point you made about command and control I think is actually the biggest obstacle to what we're doing. We have the best sensor trigger system in place in the world as a nation for the entire world. We know what's being shot where and where it's going. We have that information.

To give someone the ability to shoot an AMRAAM at a missile which may be going over Japan into the ocean or may be coming at us, that's a big deal. Right now it takes a whole lot of people to sign off on -- the North Koreans just launched a nuclear missile at the U.S., what do we do now? As you could imagine, that goes up the chain of

command to somebody and they have to make a decision on what to do.

It's really hard for us, and I say us meaning the U.S. military, to say I'm going to give a major in an F-35, I'm going to let him pull the trigger and shoot an AMRAAM at that. And the next 30 seconds will determine whether that missile is going to come at us or one of our allies or it's going in the ocean. And then you've got to determine if the AMRAAM can blow itself up in the air or turn around and go into the ocean itself. You can make it do what you want to.

That's the hardest part, I think, for the U.S. military right now. It's to say, we're going to let that F-35 pilot pull the trigger, because you've got to do it fast. You have 300 seconds. That's with liquid fuel. With solid fuel you've got to get to it in even less time. The F-35 pilot has to pull the trigger and shoot the AMRAAM.

Do we say, good to go and blows it up, or do we say no it's not good to go? That one's going to go in the ocean and they make the AMRAAM explode itself or they turn it around or do something else with it. That's a scary, scary thing that will probably never happen in the U.S. military.

Delegation down to the lowest point is not a thing that they do when it comes to nuclear war, which they shouldn't. Probably the biggest obstacle you have to boost phase is not the technology, it's the command and control. The system is the ConOps, as you said. That's what I think the biggest obstacle is.

You get a lot of pushback because nobody wants to give that major in that F-35 the ability to do that and have it be wrong. We can't do anything wrong anymore, nothing. You can't do anything wrong and push that outer bound and that authority down, I think is a scary thing for the U.S. military and DOD, for the SecDef. They don't want to do it.

Anyway, that's where I'm coming from. That's why I'm here. This is something that is doable now. I don't care what MDA says, I don't care what organization in which part of DOD says they have a \$10 million program and just give us more money and more time and we can do this. More money and more time and we can do this.

Everybody has got (their game ?) but unfortunately everybody is in a box. Everybody that does missile defense right now is in the box. I don't care if you don't think you're in the box, you're in the box, especially if you have 25 years in the military. You're in the box.

I think it's up to things like this, and it's up to us, to come out of that from different angles and say this is doable. It might not be a \$10 billion program that takes five years and a big contractor gets that job, but it's doable right now.

It's hard to get things through the DOD that are doable, that are easy, that are cheap, that are efficient, because that makes nobody happy. There's no retired general

that works for, name your company -- there's no retired general that works for company A who says, I would like to do the thing that costs no money. It doesn't get me a contract. No one says that.

But if you retire and you go to work for company A, B or C, then you push what they have a big program doing, and that's a problem here. That has stopped us from doing boost phase shoot down and really focusing on the reality of now and the art of the possible, which we could do right now, shoot down these missiles. Mattis is looking at this, Admiral Sweeney, Mattis' guy, and they all know this stuff. But they're being told by the MDA and other folks that they have a special way to do things.

That's it, Riki.

MR. ELLISON: Thanks.

REP. HUNTER: Thanks for having me.

MR. ELLISON: We're going to open it up, but I also want to make sure that we open the discussion beyond the F-35 and the AMRAAM solution, that we look at UAVs, Global Hawks with 4,000 pound laser solid state that can burn holes through the skins of missiles, from standoff ranges of 100 miles or so. So we need to broaden the discussion and also tailor it down to some of the issues that you have. With that, I'd like to open it up for any questions on boost phase.

REP. HUNTER: I'm been on the (Defense Committee ?) for about 10 years. I'm for future programs to do directed energy. I'm for lasers. I'm for nets that grab things or something.

Whatever you want to do I'm for that and I'm for putting money for that in the future. If you don't contain Korea now while they have a certain number of warheads, then the shoot down in boost phase doesn't matter anymore. We'll be using what we're talking about now, the technology for the next 100 years.

Korea is very small and exposed. One they get enough warheads for more advanced systems, we won't even be talking about this. This won't even be an option anymore. We don't talk about this with Russia, do we? There's no boost phase talk about Russia. We're not going to shoot down Russian missiles in boost phase. It's impossible.

The same thing is going to happen with North Korea. I'm pro-theory. I'm pro-theory in testing and R&D and acquisition and good things, but I'm also -- right now with North Korea you're in a very small window. If something works to hurt them now, we should do it now. Otherwise, we're not going to do anything. We'll have to treat them like a peer country with nukes, which is insane.

MR. ELLISON: Let's open it up for questions.

MR. : (Off mic) -- working for Los Alamos National Lab.

REP. HUNTER: You know Greg Canavan.

MR. : Yes.

REP. HUNTER: Greg Canavan is the guy that's talking to me.

MR. : I spent the previous 16 years as a scientist with signals intelligence. I spent 20 years previously at Johns Hopkins doing missile defense. I agree with your premise that there are ways of doing air-launch downing of missile systems. The command and control issue is one of intensely internal politics with the military.

But there is a technical problem. I did studies at Johns Hopkins decades ago on boost phase and Scud missiles with F-15s using AMRAAM and/or advanced Phoenix. What we found was that to specifically identify missile launch, and this is considered for all systems today, you needed to know that it was a missile launch and that it was a valid target. And that had to be given to the pilot within nine second to do a 150 kilometer standoff.

That meant 300 seconds was great on ICBM classes. But when you start backing off, the time gets shorter and shorter, and the travel time of your interceptor, the velocity of your interceptor, is the same. So you have to have the technology to be able to tell that it's a missile launch, identify it, and hand that off verifiably to your pilot or your system, whether it be a system on a UAV, and do that roughly within nine seconds. The times may be different now, but it's not 30 seconds, it's a very short time.

That requires a lot of technology innovation in the systems that we already have. So my question is, do you know of anyone that's working on that new technology development so that we can give the pilot the information he needs quickly enough in order to (close the gap ?).

REP. HUNTER: With the F-35 and the systems we have on our missiles now, you can do that now. Passing target information is really what the F-35 was invented for, to be networked and to be able to see everything everybody else sees. The F-35 is very good at targeting. I could be wrong. Please jump in.

MR. LAWHEAD: I think the issue that's brought up is that the difference between identifying a launch and actually getting to a weapons quality track solution for the pilot. So geometry does matter. Even a couple of 10 to 20 degrees off of actual azimuth becomes problematic.

REP. HUNTER: The MDA brought up big arguments to this, by the way, to your point, is that what if the missile moves as it's going up? The AMRAAM has its own sensor and can home in on whatever it wants to. If the ICBM moves as it's going up in

the air and it jigs, say it jigs, which it doesn't, but say that it does, then you're totally right. Right now you're able to pass target information to pilots instantaneously. Pilots can have it on their screen. Yes, no?

ADM. HILL: First of all, I'm not a Ph.D or MBA, but I do have a Masters in physics and I have (talked to Dr. Canavan ?). The aircraft launch of missiles is not off the table for us, and it's certainly being considered as part of the Ballistic Missile Defense Review that's in place right now. We have personally gone through and walked through the equations that Dr. Canavan laid down.

I'll tell you there's a lot of assumptions in there. There are assumptions in there, but I always worry about that exquisite indication of warning. You can see that in the press today.

Launch sites vary, so are you going to have the aircraft in the right position to do that? That's a pretty short-range missile. That (seeker ?) was not designed for that kind of target at those velocities. So there's work to be done. We're not saying no, we're just saying we've got to make sure we've got indications and warning right.

We've got to make sure -- it could mean that there's another missile that has longer legs to it. I'm a missileer. I've spent my career designing and firing missiles at sea. I'll tell you, when you go to the farthest range of that missile shoot, it's (a guess ?) and there's no (new capability ?).

So we're assuming full extended range of a max capability of the AMRAAM, and I'll tell you we need to do the work on that. So we're not saying no, we're just saying there's work to be done. There's atmospheric we have to worry about. There is gravity to worry about.

There is where the plane is going to be located for the trajectory. As you said, it's going north and that's over hostile territory. So all those launches are going in a direction that could put those aircraft in a hostile situation. So we want to (be comfortable ?) with all those issues.

We do lots of small programs. We're not afraid of programs that are fast and easily deployable and are less expensive. By the way, Congress kind of tells us what we're going to do and we get our requirements from the combatant commanders. So MDA is not choosing and picking which programs we're going to do or not do. I'll leave it there, if that helps.

MR. LAWHEAD: It all depends on where you are in the flight.

REP. HUNTER: So again, I'm coming at this not as somebody who is in the system, and I get all your points. MDA is not prepared for North Korea. We have been let down by DOD and all our smart guys who do missile stuff, because of the timespan, and there is no answer. The answer now is trying to get the Chinese to do nice things for

us. They're not going to do anything.

The MDA did not fix this. They've had multiple programs. They've stopped, they've started. They've stopped, they've started. We should have had a solution for this, and we haven't. It's time to come at this from a different angle and at least try what is possible now. I understand all the different -- there's a lot of problems with everything.

ADM. HILL: You wouldn't send an incompetent system to take down what North Korea throws at us today?

REP. HUNTER: I wish I had confidence in the system for us to shoot down a limited number of ICBMs.

ADM. HILL: Okay, that's great, and I'm with you. I think we need to go after the boost phase. It's in our mission set, all phases of (defense?). We're getting mid-course, we're getting terminal, so we have to get boost phase.

REP. HUNTER: What's going to happen is, once they get more than a limited number of ICBMs, this conversation is done. It means nothing. This is all defunct.

We opened a window -- we weren't ready to take advantage of this window, as a nation. That by itself makes me think that there's something wrong. Let's say it takes you a new booster or this needs a couple of other things, to me that would have been priority number one, in terms of the Missile Defense Agency looking at other threat, whether it's Iran or North Korea.

This would have been something where we said, we've got to find a fix to this now -- now. We're going to wait until North Korea has the ability to outmatch a limited boost phase capability, then it's like Russia, you shoot at us and we're going to nuke you too. That will be our policy.

ADM. HILL: We don't want to live in that world either, but I'll say again our requirements come from the combatant commanders driven a lot by what the Hill directs us to do.

REP. HUNTER: There is priority. You ought to read the NDA. There's tons of sense of the Congress -- we talk about this a whole lot in our bill. So we do.

But that's not our job. We're doing tax reform. We're doing health care. We're doing all kinds of stuff.

We have had a severe let down by the defense agencies that are supposed to do this stuff. As Congress, we do not know how out-maxed we were in our inability to hit them launching. And this goes to a lot of other places -- space. It's amazing how out-maxed we are in space.

ADM. HILL: Congressman, we are all in.

REP. HUNTER: I've been in for 10 years. You've been in MDA for how long?

ADM. HILL: Nine months.

REP. HUNTER: For nine months. I see you guys come and go. I don't mean that in (any way ?). I see you guys come and go. They all have great (plans ?) but nothing gets done.

You're two years in your job as a colonel or an admiral and then you're off and you're going to add a widget to whatever system, and you (leave ?) and you still haven't gotten this yet. This is still pie in the sky. According to you, it's pie in the sky. So the answer is there is no answer.

That's a very dangerous situation for us to be in, so we're just talking theory here. This is like being in a war college with a bunch of admirals saying, what if we could do this for America? That's great, but there's no answer.

MR. ELLISON: Let's get some other questions here on some other aspects of missile defense. I appreciate the dialogue.

MR. : (Off mic) -- can Aegis shoot down ICBM boosters?

ADM. HILL: They weren't designed to shoot down ICBMs, no. Nor were they designed to do boost phase intercepts.

MR. : (Off mic).

ADM. HILL: They have a lot of capability, but they were not designed nor are they deployed today or positioned to take down ICBMs. That's really an operational question for my friends out in the Pacific.

MR. : (Off mic) -- missile defense ships.

ADM. HILL: They're good ships and those missiles are geared for short-range, medium-range and intermediate-range, and that's what we've demonstrated. We have not demonstrated an ICBM intercept from Aegis ships.

REP. HUNTER: What's great about this too is all the stuff we're talking about now is unclassified. I talk to really smart people that work for General Mattis and they don't like directed energy because they said all they have to do is make the skin on their missile tougher and it'll be really hard to get through it. True. A laser works with a certain steel dimension, as strong as the laser is, it goes through steel.

I'm not a scientist but a soft laser doesn't go through heavy steel. You've got to have a big laser that's real hot and fast to go through heavy steel. It's the same as when you go to solid state rocket fuel for the North Koreans, your threat seconds goes to what? What is the average threat seconds of liquid fuel down to with solid state?

ADM. HILL: I don't want to talk about numbers, but --

REP. HUNTER: A solid state rocket is much faster, right?

ADM. HILL: You could have zero indication of warning from a solid rocket because there's no fueling. You have that problem again of not knowing where they're going to launch and when they're going to launch. And again, are the aircraft going to be there?

REP. HUNTER: That's a great point, and when it comes to lasers it's a great point too. They'll just make their stuff better, and the lasers won't work anyway.

ADM. HILL: It will also make them heavier and a little slower and we'll get more time on target. I mean, these are all trades, right? So again, I don't say it just because you poked at MDA so much, there are other agencies, the U.S. Air Force Red Team.

There are other agencies that have looked at Dr. Canavan math and the concept. I don't think anyone is saying no, we're just saying there's lots of problems to be solved here and we've got to understand it. We've got to set that as a priority, and I'm with you. If the nation thinks this is what we ought to go do, the Missile Defense Agency is not afraid to move forward and do it.

REP. HUNTER: I've spent a lot of time hearing there's lots of problems with this. (Move anyway ?). Literally, any time the Congress with the full Senate goes to DOD with -- because we're not in DOD. (Best in the world ?). You'll always get push-back, anything that is not there, I get --

ADM. HILL: Just to be fair, here, it's an incredibly complex part of the missile launch phase, incredibly complex. You are over enemy territory. You don't know where they're launching from. You said solid missiles and liquid missiles. They are different indications and warnings for those. This is not an easy problem and I don't think there's an easy answer.

REP. HUNTER: The answer is (bolster deterrence ?).

MR. : (Off mic) -- how do you work the ConOps -- (off mic) -- Manhattan Project to pull us ahead when we have a certain window. (Off mic) -- It kind of shows the gaps that we have. (Off mic) -- This is a finite math issue too.

MR. LAWHEAD: I'm an engineer. I try to find what the problem is, I'm trying

to solve and then go work the solutions for that. So if we want to say that the operation of the aircraft is the issue, that is not the problem to solve. We have commanders in charge of destroyers today that have the ability to launch an SM-3 to protect our mission. I'm not worried about that 35 year old commander of that ship. I wouldn't worry about the major releasing weapons on an aircraft. That's not the problem to be solved.

If that's not the problem, and I don't believe it's MDA saying no we won't go after a program with a solution today, so that's probably not the problem. So what is the problem?

It is the complexity of that part of the mission. That is a hard mission and it includes indications and warning and good intelligence, and then it involves having your assets in the right place. I don't think you want your assets over China.

REP. HUNTER: I'm going to talk up General Hyten. Do you guys know who General Hyten is? He's Strategic Command, a great guy. I'm going to talk him up.

We talked about boost phase months ago. Six months ago we went through all of this in my office. I said, so where do you focus, what agency?

He said, nothing. He said there is no agency in the U.S. government that can do what you're talking about. He said maybe DARPA, maybe.

He said there is nowhere this could reside and grow and do it fast. There is no agency in the U.S. government right now. We're not made for it.

It's not how we do testing. It's not how we do acquisitions. Call me in five or six years.

He said there is nowhere for this program to go where it could get done quickly and be effective quickly.

ADM. HILL: I think it could, but where you're at right now in boost phase, if you really think about the problem you're trying to solve, it crosses over from defense into attack operations. That's hard, right? So you're right, the Missile Defense Agency is not geared to do attack operations.

When you get into that world, it's different and you have the bureaucratic problems that (come out ?). But again, when I'm looking at the (operations ?), you're crossing into attack operations, you're crossing into the intelligence world, that is different for MDA. We don't control aircraft and we're not about going in-country and doing attacks.

We're a defense organization. That's what we do. I will tell you, though, there are unique authorities that Congress has given us to move very quickly. If you need the agency to move forward with that sort of concept, the Missile Defense Agency is there to

do that. I agree with General Hyten that there is --

REP. HUNTER: He said there is no place for it to reside and grow quickly.

ADM. HILL: Can I just make another statement. I want to thank the Congressman for his very honest and compassionate view of the world. We were kind of whispering to each other, this is a national conversation that we ought to have. I have the same concern that you have. It is that they are going to progress down the path towards nowhere it's longer a conversation about a region and containment. It is going to be one of those where they're at the table as a superpower. That is not where we want to be.

REP. HUNTER: General Mattis said it is unacceptable. It's unacceptable to have a nuclear North Korea. I also found out -- he said (boost phase ?). In his first couple of meetings he was talking North Korea and missiles.

From what I understand he had one question at the end, boost phase. That was his one question. He said, how do we shoot them before they launch? That was it.

This is what you have to do to emerging countries. You have to be able to shoot their stuff down. You have to.

In nuclear emergent countries that are bad actors, you have the option of doing nothing or shooting them down, or allowing them to become a more proliferated nuclear country. That's it. And I think we're at the stage -- if you can't shoot them down -- and again, we're talking for fun. We're just here for fun, because the window is really a year or two. That's it. I might not be here in a year or two.

This is a small window with an explicit, specific problem. This is not theory talk. This only works for North Korea, it only works for Iran out of Kuwait, and that's really it.

It's hard to shape DOD programs to a specific country when you're talking L&G (ph) and acquisition and testing. That's really hard. It's easier to do it globally.

We need a direct energy weapon. Yes, we do, and we can use it for all kinds of things. It's hard for DOD to go, we need something for this problem set and we're going to get a solution to that. That is difficult for them to do, and that's why right now there is no boost phase intercept.

ADM. HILL: So let's go back and talk about why boost phase intercept is important. We talked about the phases of flight. We kind of honed in on that today. That is because it's before the threat complex becomes more complex. So there's a real motivator for us to go after that boost phase before countermeasures and other things occur. So if it's coming towards the homeland, taking it out as early as you can, I'm all for that. So again, we're looking at (options ?) to deal with that phase. It is probably the hardest phase of missile defense, next to terminal.

REP. HUNTER: And by the way, I am such a hawk on North Korea. The reason I think this is a big deal and this is so important, they are the number one existential threat to the U.S. right now. They are. No one else is going to shoot nukes at us. It's just right now I think they are the number one threat that we have, a little crazy, and could have the ability to hurt us bad. That's why this is important. But again, it's fleeting. I mean this an answer. We may have to be back here next year and talk about what the new programs are and how we're going to stop the next North Korea.

MR. ELLISON: We know from the history of our country that this has been forced on us to deal with it. You've got to let go of the past. You're one team. You've got to bring all (forces ?) in there and it's going to force you to challenge yourself to put the best in the field. Who's the guy who said that, we can't keep doing what we've been doing? That's what (Bolton ?) said over the last decade or two decades. We're at a different juncture in the national security of our country and we need to do everything we can across the board, across all agencies, across our Congress, and get capabilities to where we don't have what looks like (vulnerability ?).

REP. HUNTER: You're joint, right.

ADM. HILL: Yes.

REP. HUNTER: If you ask the Navy what they want, they'll tell you what they want to shoot down missiles from their ships. If you ask the Air Force if that's a good plan, they say no. We want to shoot down missiles from planes. If you ask the Army if those are good plans, they say no. The Army wants to shoot down missiles from the ground.

This is too hard for the services to do, because everybody has got a stake in the game. I don't care wherever you say your objective is at, no one is objective. Everybody has got their (war bubble ?) and boss they are born and raised in, and it's hard for them to step outside of that. This is a secretary of Defense and presidential policy (period ?). They're going to have to make this call. General Mattis will have to make this call. There's no way to cut across the party lines.

(Cross talk).

REP. HUNTER: Every service has their thing and all the PSNs and all the program managers in each service have what they want. The retired general and admiral has his program that he wants that he's pitching to his buddies that are still in the Navy. That's how life works. You'll never get an overall solution unless it comes from the SecDef. This is a SecDef issue.

MR. : Has anyone to your knowledge done an end-to-end (construct ?) as to how you would dedicate or arrange or a sea-based F-35 or a ground-based F-35 out of Korea to execute the mission; I mean as far as interaction with sensor searches so that in real-

time the command says, I've got a dedicated F-35 on the ground that will always be there to launch that missile?

REP. HUNTER: You've got to have CAPs. You have to have 24/7 combat air patrols.

MR. : I'm saying has anyone yet done that? I suspect the answer is no, but I think it's (doable ?).

ADM. HILL: Not to the specificity that you just outlined. We haven't looked at it F-35s sitting on runways in South Korea. We have looked at the timelines for indications and warning and intelligence, and compared that against actual real world events. We have laid out the timelines to put -- whether it's ships or it's aircraft or unmanned vehicles -- in the right position to do boost phase. We have done that math. In fact, when I got Dr. Canavan's math we took that and compared it against the (matches ?) that we've done.

MR. : (Off mic) -- How important do you see multi-year contracts on some of the boost phase programs to assure the continuity of those programs?

REP. HUNTER: To start off, sequester is destroying the military. Sequester has literally caused the death of marines, sailors and soldiers. So it has got to go. In whatever form it has to go, it has to go. You've got a bunch of budget hawks and policy wonks in Congress who thought that sequester was cool because it's mandatory cuts to spending. Got it. I'm a conservative Republican, I understand. It's destroying the military. So that's on the first part.

Number two, for long-term projects like this it's massively important. I'm the chair of the Coast Guard Subcommittee on Transportation, besides my HASC stuff. I just have the Coast Guard multi-year procurement authority and block buy authority last year. They didn't have it. Let's just say (in these times ?) it's massively important. It gives the companies and it gives the government the ability to plan out long, to buy what you need to buy early, to take it to scale and make it a good purchase, and actually start a program. So yes, yes, and very important.

General Mattis comes in and says -- and he's been doing this for a long time -- sequester, sequester, sequester, Iran, Iran, Iran. And now it's probably Korea, Korea, Korea, sequester, sequester, sequester.

ADM. HILL: I agree with everything the Congressman said. I think it stabilizes and it does allow us to draw costs down and get more weapons out to the operators.

REP. HUNTER: I'll add just a little caveat to what I said earlier in California time. John Boehner had an article in Politico. Six years ago Boehner sat down with the Armed Services Committee before the Budget Control Act vote and said, this is for the good of the country. It will never go into effect. He looked us all in the eye. The BCA,

he said, will never go into effect for the military -- out of Boehner's mouth. Here we are. Boehner had a major hand in crippling the U.S. military, as the Speaker of the House. That's a fact. But if you're going at Congress, you can blame Congress too. His thing was cutting spending. Guess what, you can cut spending. Congratulations.

MR. : As a follow-on to that, do you see a path forward, a political way forward to get rid of it?

REP. HUNTER: It's very simple for me, on the House side. We're on the Senate side, and I know nothing happens here or is simple, ever. I understand.

On the House side, I think you put it all on the floor to lift sequester, lift the caps, social stuff, domestic spending and military spending. Then whoever is in charge of the House appropriates and authorizes to whatever level that they want to. Just because you lift the caps doesn't mean that we're going to authorize or appropriate trillions of dollars over what we bring in.

So I think you lift the caps and you give the military what it needs. I'm talking a base budget of \$700 billion -- base. I've asked three or four SecDefs if they had (their preference ?), what would the number be?

They wanted zero risk. Nobody ever answers. But at zero risk you're in the trillions. I said, \$1.2 to \$1.8 trillion a year to accept as little risk as possible, that's knowing all things that we know, how do you (measure that ?)? That's a lot of money.

The base budget should be \$700 billion right now plus OCO. That's what it should be, period. There's no way to get there without lifting sequester, none. And there's no way to deal with OCO for problems like this. You've got to use base budgeting and say hey, admiral, here's your money and here's what we'd like you to work on for a couple of years. Please fix this.

MR. : (Off mic).

MR. LAWHEAD: That's before my time, but I did watch it closely, concentrated between radar frequencies, what's better for that? I grew up in the Aegis world where S-band was important for us at-sea because it was all about volume of search. That same sort of thinking went into long-range discrimination radar, the ability to volume search and be less reliant on a cue is why we went with S-band.

The other thing is we had our discrimination algorithms proved out in that frequency. So we had high confidence that radar would perform, not relying on the overhead cues, and get to the target and get track on it. So it's a little bit of a technical trade but in terms of its operational capability very common with the S-band capability and with the algorithms that we had. Does that answer the question?

MR. : Definitely.

MR. LAWHEAD: I just want to say, thanks for asking.

MR. ELLISON: Well, thank you. We're 15 minutes over. Great discussion, thank you. It's a discussion that we need to have and be a part of.

We're going to out to Crete next week for (a meeting ?) with the Germans at EUCOM, and then we're going to follow the president a couple of weeks later into Korea, Japan, Okinawa, Guam and Hawaii. We'll probably be back and having another one of these discussions after that.

I just want to thank everybody for the time and effort to come here early this morning. Thank you, all our speakers.

REP. HUNTER: We'll do it on the House side next time.

(Laughter).