Our May Annual Meeting was attended by an overflow crowd of retirees and their guests. This year’s get together was a full day event featuring three very interesting guest speakers. If you weren’t able to attend, read about it in this issue. You can also visit our web site to view much of the presented material.

We continue to keep you informed about events at Raytheon. We’ve included a summary of recent contract awards, 2nd Quarter Financial Results, and recent acquisition news.

Your board members meet with the Raytheon pension fund managers annually. What we learned from our May meeting is described in Allen Swenson’s article.

North Korea’s missile launches, nuclear tests and sabre rattling have raised the collective anxiety level of all citizens. If you want to learn about Ballistic Missile Defense and Raytheon’s role in developing many of the system elements currently deployed read Mel Weinzimer’s article. Mel had led a Raytheon team that helped develop the SM-3 ballistic missile interceptor, an element of the Aegis system.

As is our custom we’ve provided articles
Please Send Us Your Current E-Mail Address!

Our printing, mailing and distribution costs for our newsletters are costing the Association almost $4/member each year. If you have received this Newsletter through the US Postal Service, postage was paid by your Association. If you have an email address, it could have been sent to you at no charge.

Please help us keep our costs down. Email us your name and current email address at: info@raytheonretirees.org

Send Us Your New Email, If It Has Changed (Verizon)

As some of you know Verizon is getting out of the email business and migrating all of their email customers to AOL over the next couple of months. They are providing a link for the migration so you can keep your current Verizon email address even when it’s under AOL’s umbrella if you want to. However, you can also change your email address to something other than the Verizon.net name. Such as yahoo, gmail, comcast, etc. and not go with AOL if you so desire.

This is a reminder that if you decide to change, or have changed, your email address for any reason please contact us to let us know, so we can update our records.

The Raytheon Benefit Center

Every week we receive half a dozen emails or phone calls from ARR members or others who spot us on the web. Some ask difficult questions where we can provide some insight. In most cases, however, the requester merely needs to know how to contact the Raytheon Benefit Center. Too many of the requests are from spouses or lawyers who are attempting to obtain data regarding ill or deceased retirees. So make sure that your family has the following information regarding the Raytheon Benefit Center:

https://raytheon.benefitcenter.com
800-358-1231 press 3
Social Security Number
Password
Hours: 8:00 am to 8:00 pm Monday -Friday
The RBC has an International number 800-395-1273

You should all ensure that you have set up an account and have obtained a password that you can also share with family. If the password is not known the system will ask for one after asking for the Social Security Number. Ignore that request and eventually you will be connected to a real person.

ARR Annual Meeting Enjoyed by All!
By: Mel Weinzheimer

An overflow crowd of retirees and their guests attended our 2017 Annual Meeting held on May 25th, 2017. This year the meeting was extended into the afternoon to accommodate a full agenda of guest speakers. We also returned to our practice of providing both breakfast snacks and lunch to our attendees.

ARR Directors provided reports on ARR organizational status (J. Rudy), finances (A. Swenson), medical and insurance (J. DeAmbrose), Membership and Communications (M. Weinzheimer) and Pension Funds status (A. Swenson).
Three guest speakers provided interesting & provocative presentations. Professor Craig Armiento of the University of Massachusetts, Lowell spoke about the work at the Raytheon-UMass Lowell Research Institute (RURI) and the Printed Electronics Research Collaborative (PERC).

Debra Brede, founder and president of D.K. Brede Investment Management Company presented an interesting overview of the history and trends of the stock market.

Bob Cuozzo, Vice President for Missile Defense Radar development at Raytheon's IDS division presented a timely discussion on Raytheon's approach for providing Ballistic Missile defense for Hawaii.

Jon Longley, President of the Retirees School Volunteer Association, described the work Raytheon Retirees are doing in volunteering at schools throughout the greater Boston area.

Thanks go to our board members for putting together a great event and also thanks go to Debra Brede for sponsoring a delicious lunch. It was great to see our coworkers and friends get together at the annual meeting and reminisce. We hope you’ll join us for next year’s meeting and participate in a day filled with interesting speakers and greeting old friends.

Fidelity Articles on Retirement
By: John Rudy

When at Raytheon, Fidelity managed my RAYSIP and I stayed with Fidelity after retirement though I transferred the money to a Fidelity IRA. Thus I get a periodic newsletter which, presumably is public knowledge.

Some years ago I spoke to my advisor who said that I could reference it to Raytheon folks as long as I provided proper attribution.


Though this is titled “getting ready to retire” many of the articles are applicable to retirees and I thought that most would find them interesting. The top line gives you three boxes to click on, each of which provides different references below:

Income Basics
Strategies If you're 55-65

I clicked on 65 plus. I thought that five common annuity myths was particularly interesting if one wants to provide for an ill family member if you pass away.

They give you the option to sign up for their newsletters. I don’t know if you need a Fidelity account to do so.

Potential Hurricane Harvey Phishing Scams
By: John Rudy

We all know how to avoid email phishing scams, of course, but with a natural disaster like Harvey it is all too easy to get caught up in the moment and abandon our usual caution. All of this advice will continue to be pertinent after Hurricane Harvey fades so you can just replace the word “Harvey” with the current disaster.
The Original release date for this information was: August 28, 2017.

US-CERT (United States Computer Emergency Readiness Team (US-CERT)) is an organization within the Department of Homeland Security’s (DHS) National Protection and Programs Directorate) warns users to remain vigilant for malicious cyber activity seeking to capitalize on interest in Hurricane Harvey. Users are advised to exercise caution in handling any email with subject line, attachments, or hyperlinks related to Hurricane Harvey, even if it appears to originate from a trusted source. Fraudulent emails will often contain links or attachments that direct users to phishing or malware-infected websites. Emails requesting donations from duplicitous charitable organizations commonly appear after major natural disasters.

US-CERT encourages users and administrators to use caution when encountering these types of email messages and take the following preventative measures to protect themselves from phishing scams and malware campaigns:

- Do not follow unsolicited web links in email messages.
- Use caution when opening email attachments. Refer to the US-CERT Tip Using Caution with Email Attachments for more information on safely handling email attachments.
- Keep antivirus and other computer software up-to-date.
- Refer to the Avoiding Social Engineering and Phishing Attacks for more information on social engineering attacks.
- Review the Federal Trade Commission information on Charity Scams.
- Verify the legitimacy of any email solicitation by contacting the organization directly through a trusted contact number. You can find trusted contact information for many charities on the BBB National Charity Report Index.
SPOTLIGHT: Mike Segal
By: Mel Weinzimer

We are highlighting Mike Segal in this issue’s Spotlight series.

Mike Segal, a Baltimore Maryland native, joined Raytheon directly out of the University of Maryland’s College of Engineering in 1968. First as a Hawk Product Engineer, he worked with Andover and Waltham facilities as well as the Bedford Labs. After joining the Patriot Program, he ultimately worked on the BedLabs design/development of the Patriot Missile which he transitioned to Andover production as Section Manager, Department Manager and Andover Engineering Manager. His subsequent assignments were as Test Systems and PFC Lab Manager along with a special assignment in Lowell as the Test Equipment and Test Engineer Manager on AMRAAM, Sparrow, Sidewinder, and Phoenix. He retired Jan 1, 2006.

MW: Mike, where do you make home now and what do you do to keep busy?
MS: My wife Carol and I raised our family in Lexington where we continue to reside after 41 years. My primary activity has been in Lifelong Learning, seniors teaching seniors in an all-volunteer environment. After enjoying programs at Brandeis and Tufts, I became a founding & Board member of LLAIC.org, Lifelong Learners: An Independent Collaborative. Other volunteer activities have been at Lahey Hospital & Medical Center tutoring, and Town Meeting Member.

MW: Do you stay in touch with any of the people that you had worked with at Raytheon?
MS: I enjoy Monthly Andover Engineering Breakfasts with my Andover friends, periodic lunches with Radar/MSL friends at the Lowell Knickerbocker, and a RoundTable in the North End at Christmas time with Bedlabs friends. Many one-on-one get-togethers are also very enjoyable.

MW: Who are the leaders that you worked with that you most admired at Raytheon?
MS: I was blessed to be acquainted with many of the great Raytheon leaders who exemplified superior skills: Charlie Mitchum - an astounding turnaround manager, Bill Swanson - instilled competitive spirit in his leadership Team, Pietro Ventresca - phenomenal interpersonal relationships with engineers, Ted Smith - an unequalled exemplary rapport with all levels of management, engineers & union personnel, Bob Filosa - focused on Teamwork and individuals alike.

MW: There’s a saying that scientists discover things but engineers make things that change the world. What did you do to change the world that are you most proud of?
MS: Over time and with some maturing, I recognized that TEAMWORK of our diverse functional organizations as well as recognition of the individuals who had families, obligations and needs was the key to our success. Having the opportunity to rotate into different programs, plants, and functional organizations enabled me to attempt to focus on teamwork while acknowledging the individuals.

MW: Would you like your fellow retirees to contact you? If yes, how can they reach you?
MS: Yes, I would. Hearing from Raytheon family would be terrific. I can be reached by email at segal.michael@gmail.com and by cell at 978-265-1639.

Golf Tournament Considered/Planned
By: Mel Weinzimer

Are you a New England golf player and interested in participating in a tournament? The ARR would like to sponsor a golf tournament for our ARR member golfers sometime in 2018, if there is enough interest. If you would like to participate in this type of event please contact us at info@raytheonretirees.org or leave a message at 978 369-8410. We’ll begin the planning of this event if we hear from enough of you! So let us know.

Please contact us by Nov. 20th if you have an interest in playing. This will help us in our planning of the event including selecting a location. Thanks!
A New Raytheon Security Acquisition
By: John Rudy

REDOWL

Raytheon has been making serious inroads into the CyberSecurity domain. Most recently they acquired a company called RedOwl.

Under the deal, RedOwl's technology and staff of about 60 are being absorbed by Forcepoint, a company based in Austin, Texas, that specializes in content security and data protection and which is a portion of Raytheon. Financial terms of the deal were not disclosed.

See the following article for details:

Raytheon Contract Awards & Press Releases
By: Mel Weinzimer

Raytheon awarded $1.07B contract to provide the State of Qatar with Early Warning Radar System (Feb. 24, 2017) Raytheon Co., Woburn, Massachusetts, has been awarded a $1,066,297,129 fixed-price, incentive-firm letter contract for a Qatar early warning radar system. Contractor will provide an early warning radar system that will be integrated into the Qatar integrated air and missile defense enterprise.

U.S. Department of Homeland Security re-awards DOMino cybersecurity contract to Raytheon (June 19, 2017) This contract was initially awarded to Raytheon in Sept. 2015. Northrop Grumman subsequently filed a total of five protests that were all finally denied leading to the re-award in June, 2017. This IDIQ contract has a value of up to $1 billion over five years. Raytheon will be the prime contractor and systems integrator to help safeguard the .gov domain by providing design, development, operations and maintenance services in support of DHS’s National Protection and Programs Directorate. Under the contract, Raytheon will help develop DHS’s next generation National Cybersecurity Protection System, delivering new and upgraded capabilities, including: Intrusion detection and prevention, Automation, Analytics and Information sharing.

$600 million to sustain and modernize U.S. Army strategic software systems (June 8, 2017) A contract valued up to $600 million for
software support and sustainment to modernize missile defense and other strategic systems. The work will be conducted at the Software Engineering Directorate, U.S. Army Aviation and Missile Research, Development and Engineering Center at Redstone Arsenal.

$375 million initial contract to upgrade U.S. Air Force Air and Space Operations Centers (April 26, 2017) The U.S. Air Force Materiel Command has awarded Raytheon Company a contract with an initial value of up to $375 million over six years to sustain and modernize the Air and Space Operations Centers (AOCs). The AOCs are the center of command and control of global forces and operations, providing real-time situational awareness and decision support to military commanders and planners. The scope of the contract includes the following:

- Upgrade AOC computer systems
- Install new computer hardware and software
- Provide training and support
- Improve system security and network connectivity

The contract will be executed at various locations worldwide, including the United States, Europe, and Asia-Pacific regions. The work will be performed by Raytheon’s Air and Missile Defense Systems business unit, located in El Segundo, California.

U.S., allies invest $202 million in Patriot Integrated Air and Missile Defense System (Feb. 13, 2017) Raytheon Company has begun work on enhancements to the combat-proven Patriot Air and Missile Defense System (PAMDS) that will make it more capable and effective in defending against modern threats. The U.S. Army Contracting Command awarded Raytheon a $202 million contract to modernize the PAMDS weapon system, which is used to protect military bases and cities from enemy missiles.

Raytheon Wins $128 million advanced mobile sensors program (Feb. 27, 2017) The U.S. Air Force awarded Raytheon Company a four-year, indefinite-delivery/indefinite-quantity (IDIQ) contract valued up to $128 million to provide mobile radar systems for air and missile defense. Under the contract, Raytheon will deliver the Cobra King radar system to the U.S. Navy and the Gray Star radar system to the U.S. Marine Corps. The systems will be used by military forces around the world to detect and track enemy aircraft and missiles.

$116M Army contract for Long-Range Precision Fires technology maturation and risk reduction (June 12, 2017) The U.S. Army awarded Raytheon a $116.4 million contract to enter the technological maturation and risk reduction phase of the Long-Range Precision Fires (LRPF) program. LRPF is a new, longer-range surface-to-surface weapon that can defeat land targets out to 499 kilometers. The funding will support the development of a new, longer-range surface-to-surface weapon that can defeat land targets out to 499 kilometers.

$92M US Navy Enterprise Air Surveillance Radar Contract (Aug. 19, 2016) Raytheon Company has been awarded a $92 million contract to develop and manufacture an advanced radar system for the U.S. Navy’s Enterprise Air Surveillance Radar (EASR) program. The EASR will provide long-range surveillance and target Acquisition for the U.S. Navy’s aircraft carrier strike groups.

U.S. Navy awards Raytheon $28 million for Variable Depth Sonar (May 23, 2017) The U.S. Navy has selected Raytheon Company to provide the new Variable Depth Sonar (VDS) for the Littoral Combat Ship (LCS). The contract is valued at $27.9 million and will support the LCS program to improve the ship’s ability to operate in shallow waters.

News Releases

For additional information on the above contract awards or technical achievements and milestones, please visit the Raytheon.com website and select: News / News Releases.
Retiree Medical I. Lockheed Martin has made a significant change to their retiree health plan based on information in its 2015 Form 5500 Annual Report for the Plan filed with the Department of Labor. This summary is based on information contained in that filing.

Prior to the change, LM provided health coverage through an insurance arrangement. The substance of the change seems to be that eligible retirees no longer receive insurance through an LM plan. Rather, they obtain their own insurance coverage from an insurer of their choice, i.e., retirees choose the insurance provider and pay the premium. LM does provide a third-party one-stop shopping location where counseling and insurance plan choices are made available.

In conjunction with the choice arrangement, LM has established a “health reimbursement arrangement” (HRA) pursuant to which eligible retirees are granted an annual credit against which medical expenses can be charged, including the insurance premium. The annual credit amount is stated to be $900 in the filing and if not used during the year, can be carried over to succeeding years. The HRA is only available to Medicare-eligible retirees. The source of the funding for the annual credits/reimbursements are so-called 401(h) accounts in the LM Salaried Pension Plan and the LM Savings Plan, a 401(k) plan.

This innovation is to be contrasted with the Raytheon retiree medical arrangement which involves a self-insured retiree medical plan (the “Plus” plan) designed to supplement Medicare coverage. Raytheon also makes available supplemental coverage under a few other insured plans. In 2015, retirees choosing the Plus Plan numbered about 16,800 while retirees choosing one of 12 insured plans numbered about 3,600. Whether participating in the Plus Plan or any of the insured plans, Raytheon subsidizes the cost of coverage at various levels with the most common annual subsidy being $512 annually. For the Plus plan, retirees pay any additional cost of coverage for the year (the total cost is apparently based on prior year’s cost experience, an exercise conducted behind a curtain). Retirees electing to choose coverage under the insured plans pay the full premium required by the insurance company; the Raytheon subsidy is apparently reflected in that premium. For 2017, the retiree cost of participating in the Plus Plan is about $576 ($48/mo). The source of the funds for the Raytheon subsidies are 401(h) accounts in the Raytheon Salaried and Hourly pension plans (the amount in the Hourly 401(h) account is very small), separate Trusts (VEBAs), and direct payments by Raytheon. For 2015, the last year for which Form 5500 information is available, the amounts in the 401(h) accounts was $169M and the amounts in the VEBAs was $208M.

What would happen if Raytheon were to adopt an arrangement similar to LM? With a high degree of speculation, this would probably mean that the Plus plan and the other insured plans would no longer be made available. Similar to LM, Raytheon would set up an arrangement with a third-party through which eligible retirees could receive counseling and select from a broad offering of insured plans. Raytheon would establish an HRA with an account for each retiree eligible for retiree medical. Each year, each retiree’s account would be credited with the existing subsidy -- $512 for most retirees although this amount could possibly be adjusted one way or the other. Documented medical expenses such as the premium for the selected insurance coverage, Medicare premiums, and the cost of any other medical expense incurred could be reimbursed from the retiree’s account. Any amount not used would carry over to succeeding years although an excess is unlikely given the amount of insurance premiums, Medicare premiums and other medical costs incurred in a year.

For a retiree now being covered by the Plus Plan or one of the other insured plans, whether such an HSA arrangement is better would come down to a comparison of cost and coverage provided, e.g., on-your-own plan vs. the Plus plan. Many would agree that the Plus plan is reasonably priced with decent coverage.

A significant cost could be incurred by Raytheon in making such a change because not all eligible retirees are now receiving a subsidy, many having coverage under a spouse’s plan or some other plan or simply being unaware of their eligibility. The number of eligibles compared to the number actually participating is not revealed in the
annual DOL filings, There could be a significant number of such non-participating eligibles and providing an HRA credit to members of this group (if required) would be an additional cost to Raytheon (but arguably a justified and equitable cost).

Retiree Medical II. A Notice was issued by Raytheon in October, 2016 to retirees participating in any one of the three insured plans offered in eastern MA. The message was that none of the three plans would be made available in 2017 and the Plus plan would be the only option for medical coverage. As noted above, Raytheon has historically provided coverage through the Plus plan and specified insured arrangements. The Plus plan apparently provides coverage regardless of geographical location but the insured plans typically are arranged with insurers in specific locations. For example, for 2015 the insured plans offered in eastern MA were a Blue Cross HMO plan, a Tufts Medicare Preferred HMO Plan and the Fallon Senior Plan So, none of these insured plans were made available for 2017. The reason given was that the plans did not meet Raytheon’s data security requirements. It is not clear if any other insured plans were made available in eastern MA or in any other part of the country for that matter. The data security reason just seems implausible.

Retirement Reading. For those approaching retirement and retirement decisions, suggested readings include:
3. Social Security Made Simple, Mike Piper, CPA, Simple Subjects, LLC 2017 (109 pages)

Veterans Benefits. Health Care. Many Raytheon retirees are veterans and could be eligible for veteran’s benefits. Some know it and some probably do not. There are too many federal and state benefits to address so here is a capsule of information on health care which is probably the most significant benefit and the one that is often a bridge to eligibility for other benefits.

The general principle is that all honorably discharged veterans are eligible for free VA health care but there are echelons of eligibility and availability which may effectively reduce or eliminate the benefit or add some cost when available. However, one factor that substantially increases the likelihood of obtaining complete and free coverage is the presence of a service-connected disability and no, it is not necessary to be wounded in action. A service-connected hearing deficiency is fairly common, easy to explain, so it will be used as an example here.

There is obviously some burden to establish that hearing loss is service-connected, but the hearing of retirees is likely to be somewhat impaired which is the first hurdle. Retirees are likely to have served at a time when no hearing protection was provided while operating in a very noisy environment, e.g., weapon firings, aircraft flight lines, etc. Establishing that a hearing problem has been around for a while—the longer the better—and that there was exposure to a noisy environment during the period of service, could result in a determination of a service-connected disability.

What is achieved with a successful claim? First, a service-connected hearing disability is usually considered a 10% disability which could result in a small monthly compensation payment. The entitlement to compensation is not “means tested”; neither income nor assets are taken into account.

Second, and perhaps of most importance, with at least a 10% service-connected disability, there is enhanced eligibility for free VA health care benefits—including no means testing (Nevertheless, financial information may have to be provided in the initial claim process).

Raytheon retirees, are probably receiving health care through the Medicare system, including some Raytheon provided supplements or other similar coverage. Access to the VA healthcare system might not be particularly important, although co-pays and deductibles could be covered, but establishing eligibility does provide an additional level of health care security. Extended prescription drug coverage alone could be a valuable benefit.

Application for entry into the VA healthcare system can be made through a local Veteran’s Affairs Officer or application can be made directly via the websites of local area VA hospitals (e.g., Boston, West Roxbury, or Bedford). If appropriate, a claim for a service-connected disability could also be made.
Raytheon recently announced that the second quarter results continue to be strong. The sales for the quarter were up 4.2% to $6.3 Billion and up by 3.8% for year to date. Although the current year’s profit was down from the previous years, this drop because the previous year’s profits were unusually high due to significant tax free gain of $.53 per share that resulted from a gain on the sale of Thales Raytheon Systems. Otherwise current profits would have been up.

Cash flow and backlog were strong and the company repurchased $591 million of debt and has repurchased $500 million of common stock this year. The disclosure did not mention any contributions to the Pension Fund but that is not unusual.

Accrued liabilities for retiree benefit remain at $7.7 Billion at the end of the second quarter.

Raytheon increased its financial outlook for the total year for both sales and earnings per share. The Raytheon stock price continued to increase reaching $178 in August.

---

**Veteran’s PX Privileges.** A separate veteran’s benefit development involves Post Exchange (PX) privileges which historically have only been granted to active duty service members and those retired from military service (and some other narrow groups such as DOD employees) — but not to all veterans. A recent DOD pronouncement allows all veterans to make online (only) PX purchases. The privilege will commence on November 1, 2017. Purchases via the online PX are not subject to state or local sales tax and prices may be better than on the commercial market, although some retailers already provide discounts to veterans (e.g., Home Depot). A nice additional benefit for veterans.

There is a registration process for identification purposes. The online registration is at VetVerify.org which can be accessed currently. However, long-ago veterans should expect some problems with registration. Apparently, long-ago identification did not use social security numbers which is the main identifier today. Also, many veteran records were consumed in a fire years ago so proving veteran status may not be seamless. At any rate, pull out discharge papers (DD214) to get the ball rolling.

---

**Free Cards**  
By: John Rudy

If you are like me the number of birthday, anniversary and other cards you send has drastically decreased. When I was a kid it cost more to phone than to buy a card, and so we bought cards. Today phone calls are free. But that shouldn’t stop you from sending a card AND making a call.

What some may not know is that there are many FREE services out there for creating and sending cards of all types. This is the one I use / www.123greetings.com/anniversary/

Though this URL links to the Anniversary page you can change the type of card on the top of the web page. They have thousands of cards and so far I haven’t seen any advertising.

Now, every time you send a free card put $5 in a jar and at the end of the year you can purchase a 55” TV.

---

**Raytheon-Umass Lowell Printed Electronics Research Collaborative (PERC)**  
By: Wayne Johnson

As part of our May Annual Meeting, Professor Craig Armiento, from the University of Massachusetts Lowell, was a guest speaker who described the Raytheon IDS and Umass Lowell initiative known as RURI (Raytheon Umass Lowell Research Institute). Shortly after it was started, a new initiative funded by DoD, state government and industry was awarded for $200M under the Advanced Manufacturing Initiative and RURI was a key component. The referenced video below describes the work underway and known as PERC (Printed Electronics Research Collaboration).

www.uml.edu/Research/PERC/
National Parks
By: John Rudy

The National Parks are one of the real wonders of the USA and though they have been spoiled in the last 50 years with endless commercialization, paved roads, etc. they are well worth viewing. Some years ago I became aware of, and purchased, a $10 SENIOR LIFETIME PASS to the national parks. This one purchase allowed me to bring in my wife. They have just announced that on August 28th the price will be increased to $80 ($20 for an annual pass). Though it is now too late for this special rate (we did send a note to our membership on July) I would still encourage everyone to take advantage of this offer as a one-time charge of $80 is still a great deal. They can be purchased in person at most national parks or on-line with a surcharge. I bought it at the John Adams house in Quincy.

www.nps.gov/planyourvisit/passes.htm has a link to Senior passes which provides all the information that you need. Then just start using it.

Ballistic Missile Defense
By: Mel Weinzimer

Ballistic missiles have become a serious threat to international security. The recent test launches by North Korea and the heated rhetoric between the Trump Administration and North Korea have once again raised anxiety and concerns about the threat that ballistic missiles present and the effectiveness of Ballistic Missile Defense systems. Do these systems work? How well can they protect our homeland, South Korea, Japan, Hawaii and of course Guam? Do they provide an effective shield against the threats they are designed to counter?

This article presents a brief primer on missile defense: the threats, the systems we have deployed and Raytheon’s contribution. I’ve included links to other web sites that provide additional information. The material in this article was obtained from open source literature including the New York Times, Wikipedia, Raytheon Company’s web site, The Guardian, Defense News, and The Center for Strategic and International Studies.

OVERVIEW
Missiles are fast, traveling up to 15,000 mph. They can cover long distances, with the most advanced missiles reaching into space and traveling over the North Pole to hit targets. Of special concern are long range ballistic missiles (ICBMs) from countries having nuclear weapons.

Our missile defensive systems have evolved over the past 30 years into its current form of layered defense. The United States and its allies have developed several overlapping systems of land, sea and space based sensors and missile interceptors to stop missile attacks. Raytheon plays a major role in almost every one of them.

Layers of defenses, each focusing primarily on a flight profile of a certain category of ballistic missile, with some overlap in between, utilize an
array of interceptors and sensors to get the job done. The MIM-104 Patriot missile battery can be used to counter short-range ballistic missiles over a localized area. THAAD is aimed at taking out medium to intermediate range ballistic missiles within a specific theatre of conflict. AEGIS at sea and ashore can swat medium to longer-range ballistic missiles out of the sky within an entire region. Finally, there’s America’s hulking ground-based long-range interceptors (GBI) focused on taking out our most serious threat, ICBMs, before their warheads descend onto the US.

All these systems are supported by a massive array of remote sensors and communications nodes, ranging from a constellation of orbital infrared surveillance systems, to land based X-Band Radars to a fleet of massive radar equipped tracking ships.

**HOW DOES LAYERED MISSILE DEFENSE WORK?**

**GROUND BASED MIDCOURSE DEFENSE (GMD)**

GMD is the only U.S. missile defense system currently devoted to defending the U.S. homeland from long-range ballistic missile attacks. First operationally fielded in 2004, GMD includes two Ground-based Interceptor (GBI) sites at Ft. Greely, Alaska and Vandenberg AFB, California, seven types of sensors, and various command and control systems. By the end of this year, a total of 44 GBIs will be deployed, 40 based at Ft. Greely, and another 4 at Vandenberg AFB.

When satellite sensors initially detect a missile launch from the heat signature of its plume, that information and data from other radars is fused and fed into a fire control system, which is then used to launch one or more GBIs. The GBIs fly into the path of an incoming missile before releasing an Exo-atmospheric Kill Vehicle (EKV), developed by Raytheon, which uses onboard sensors to itself detect and then hunt down the warhead, destroying it with the force of physical impact (known as hit to kill).

**TEMINAL HIGH ALTITUDE AREA DEFENSE SYSTEM (THAAD)**

The THAAD system is designed to shoot down short, medium, and intermediate range ballistic missiles in their terminal phase (descent or reentry) by intercepting with a hit-to-kill approach. The system is
globally transportable and rapidly deployable and includes a Raytheon
developed radar (AN/TPY-2), a Fire Control System and missile
interceptors that can engage the threat inside or outside the atmosphere
during terminal phases of flight. There are six active THAAD batteries
currently deployed around the world including Hawaii, Guam, South
Korea, Turkey, United Arab Emirates and Israel. For further information
see https://en.wikipedia.org/wiki/Terminal_High_Altitude_Area_Defense

AEGIS BALLISTIC MISSILE DEFENSE SYSTEM. The AEGIS Sea Based
System is designed to shoot down short, medium, and intermediate
range ballistic missiles in their terminal phase (descent or reentry), like
THAAD, by intercepting with a hit-to-kill approach. Aegis includes a mix
of interceptors, sensors, and command and control. The primary sensor
for the missile defense mission is the SPY-1D radar, an S-band radar
housed on the deckhouse of the ship. The SM-3 missile interceptor was
initially developed jointly by Raytheon and Hughes and now is produced
by Raytheon. It included a Kinetic Kill Vehicle, similar to the THAAD KKV
seeker. There are 33 Aegis Warships (Destroyers and Cruisers) now
deployed in the Atlantic and Pacific with long range surveillance tracking
and ballistic missile defense capability including SM-3, SM-2 and SM-6
missiles.

AEGIS ASHORE is a land based variant of the sea based system. The
SPY-1 radar and SM-3 missiles are sited on land and can defend large
geographical areas such as Eastern Europe. A test system is located
in Kauai, Hawaii and systems are planned to be located in Poland and
Rumania.

SHORTER RANGE ANTI-BALLISTIC MISSILES. Three shorter range
tactical anti-ballistic missile systems are currently operational: the
U.S. Army Patriot, U.S. Navy Aegis combat system/SM-2 missile,
and the Israeli Arrow missile. In general short-range tactical ABMs
cannot intercept ICBMs, even if within range. The tactical ABM radar
and performance characteristics do not allow it, as an incoming ICBM
warhead moves much faster than a tactical missile warhead. However,
the better-performance Terminal High Altitude Area Defense missile
could be upgraded to intercept ICBMs. The SM-3 missile may have
some capability against ICBMs, as demonstrated by the shoot down of
a satellite in 2008. The ARROW-3, developed jointly by the US and Israel
and recently declared operational, can intercept ICBMs.

SYSTEM PERFORMANCE - TEST RESULTS. Test results of all of these
systems have been mixed. 76 of 93 hit-to-kill intercepts attempts have
been successful across all missile defense programs since 2001. That
leads one to assume that one must shoot multiple missiles to have a
high confidence of taking down one incoming missile. A brief summary
follows. A more detailed list of test results can be found at the Missile
testrecord.pdf

GBI. There have been 31 GBI flight tests. Eighteen of these 31 have
been intercept tests involving an attempt to hit a target, rather than mere
flight tests. Of these 18, there have been ten successful intercepts for
a success rate of 56%. This includes the most recent successful test in
July against an ICBM-class target.

THAAD. The most recent test of THAAD was conducted in June. A
THAAD battery located in Kodiak, Alaska, successfully intercepted an
intermediate range ballistic missile target launched over the Pacific. This
was the 14th successful intercept in 14 attempts overall for the THAAD
weapon system, according to the Missile Defense Agency.

AEGIS. The test record of the Aegis program and hit-to-kill intercept
within the Standard Missile family broadly now stands at 35 successful
intercepts out of 43 attempts against ballistic missile targets. The most
recent test of an SM-3 IIA, conducted in June, ended in failure when the
missile failed to hit the target. This was the fourth flight test of the IIA
version and the second intercept attempt with that missile to date.

PATRIOT. Patriot has achieved a success record of 18 out of 20
successful intercepts of the Patriot Advanced Capability-3 missile.

ARROW-3. On December 10, 2015 Arrow 3 scored its first intercept in a
complex test designed to validate how the system can detect, identify,
track and then discriminate real from decoy targets delivered into space
by an improved target missile. A second intercept test is schedule in
2018 from Kodiak, Alaska.
Directors

John Rudy, Co-President  
john@raytheonretirees.org

Mel Weinzimer, Co-President  
mel@raytheonretirees.org

Joe DeAmbrose, Clerk  
joe@raytheonretirees.org

Al Swenson, Director  
al@raytheonretirees.org

Wayne Johnson, Director  
wayne@raytheonretirees.org

Norm Harkins, Director  
norm@raytheonretirees.org

Linda Shaw, Director  
linda@raytheonretirees.org

Mel Weinzimer, Co-President  
mel@raytheonretirees.org

Al Swenson, Director  
al@raytheonretirees.org

Wayne Johnson, Director  
wayne@raytheonretirees.org

Linda Shaw, Director  
linda@raytheonretirees.org

Nicole Cormier, Office Manager  
info@raytheonretirees.org

Association of Raytheon Retirees, Inc.

PO Box 365  
Marlborough, MA 01752  
Phone: 978 369 8410  
E-mail: info@raytheonretirees.org

We are on the Web  
raytheonretirees.org

Please send completed form and contribution ($20 Annual Dues) to: 
Association of Raytheon Retirees, Inc.  
PO Box 365  
Marlborough, MA 01752  
or
You can also complete this form and register online at 
www.raytheonretirees.org  
or
Email us at info@raytheonretirees.org

© 2017 by ARR. This publication is designed to provide authoritative information regarding the subject matter covered. The Association of Raytheon Retirees (ARR) is not engaged in rendering legal, accounting, tax, or other professional services. If expert assistance is needed, the reader is advised to engage the services of a competent professional. Consult with a tax or other professional advisor before making any decisions regarding personal finances.*

*The Association of Raytheon Retirees is not associated with Raytheon Company.