Conference Trip Report

Ottawa and Montreal, Canada

March 5-8, 2023

Day 1 - Monday, March 6

Area X.O areaxo.com

As a special kickoff at our morning breakfast meeting at the historic Fairmont Chateau Laurier, we were joined by special representatives from Support our Troops, the chosen recipient of our DOCA Defense Fund donation for this Conference. SupportOurTroops.ca meets the unique needs and special challenges faced by members of the Canadian Armed Forces community as a result of military service. It operates within Canadian Forces Morale and Welfare Services and was therefore a perfect fit for what the DOCA Defense Fund hopes to achieve with our donation dollars. They have promised to share with us what they do with the funds, we will provide an update to the members when they do.

Area X.O, our first host, is essentially a technology research park, funded by the provincial economic development agency, but managed by industry partners for the sake of future commercial products which benefit us all (and hopefully create local jobs). It provides a well-managed, integrated test facility bringing together small to large, even international companies, innovators, and entrepreneurs to advance the development, validation, and adoption of "connected" next-gen technologies, such as robotics, unmanned aerial vehicles, autonomous ground vehicles, internet-of-things, advanced communications, artificial intelligence, communications cybersecurity, and plug-and-play sensors. At its heart, Area X.O has almost 2,000 acres of purpose built city street infrastructures, including pedestrian areas, railroad crossings, intersections and the like, a sort of mouse-in-a-maze city, creating a real world testbed environment for testing any size drones, UAVS, and all sorts of autonomous vehicles on the ground and in the air, all within a protected test environment supported by modular sensors, with advanced cellular technology networks to control and monitor the vehicles from heavy hitter partners such as Blackberry, Nokia, Ericsson, and Microsoft. In addition to driverless autos being tested for municipal use, such as garbage trucks, medical transports or taxis, they have entire garden blocks for aerial drones to fly observation patterns, autonomously monitoring crop greenhouse gas emissions and nutrient take-up, they have full size railroad crossings to test how driver-less cars react to safety signals sent over the cellular network which automatically warn cars of real time train movements, all in true four season weather conditions, including the ice and snow still piled up high as we quickly move from the bus to the main building to begin our briefings. Essentially, the public-private investment here provides a technology playground for anyone with valid product ideas ready to test, it can be free for small companies with employees in Ontario but operates on a fee plus cost recovery basis for larger firms. But we weren't here to see the smart mobility efforts, or the advanced communications research, nor the smart agriculture farms. We were here to see the defense and security projects.

Happy to be back inside, we found ourselves in an outdoor/indoor vehicle garage to meet with our technology demonstrator from Mission Master, a Canadian firm owned by German defense giant Rheinmetall. Roughly the size of a compact car, but capable and rugged in all-terrain, these flat-topped vehicles are like a modern pack mule, able to carry gear and follow soldiers either like a dog on a leash, using a remote like an xbox game station, or autonomously controlled via remote network connections, providing resupply and freeing soldiers up to carry out other duties while keeping them out of danger. Completely modular, they can be equipped with a variety of sensors and payloads (even weapons) to meet any mission. They can also be loaded on cargo planes or slung under helicopters and can be placed in remote areas unsafe for humans to, say, parachute in. These features are not only attractive to military customers, but other government agencies as well; if they can carry gear into a remote battlefield and carry casualties out, then they can also carry emergency supplies in and survivors out of a disaster zone. These vehicles are already being used in Canada at remote gold mines in heavily forested areas and in Australia for firefighting efforts in roadless areas.

Canadian War Museum warmuseum.ca

Designed by Canadian born architect Raymond Moriyama, who also designed the Canadian Embassy in Tokyo, but was ironically himself confined to an internment camp by the Canadian government in WWII, the Canadian War Museum houses over half a million objects, from canteens to jets, related to the nation's long military history. Although typically closed on Mondays, we were fortunate our CAF liaison knew a guy who happened to be the museums managing director and chief curator, who had recently built the war in Afghanistan exhibition, and he was happy to arrange for us to have a private tour of the museum. And what a private tour it was, not only was our tour private in the sense that the chief curator himself was our own personal guide and lecturer, but that the entire museum was closed to the public with just us and a few researchers inside. We managed to quickly scoot him past the early days of war in Canada, especially past the parts where Canada successfully repelled two American invasions and burned the White House and spent most of our time in the areas on Canada's efforts alongside America in the World Wars, Cold War, and the Global War on Terror. An architecturally significant structure and a world class military museum, I would highly recommend a visit if ever in Ottawa not on a Monday. For the record, while large museums are usually filler material for us on

DOCA conferences, this visit was enriching, irreplicable, and well worth the time spent before our afternoon meeting with CGAI.

Canadian Global Affairs Institute cgai.ca

Switching modes on the fly from technology to history to policy, we sat down with Dr. David Perry, President of "Global Affairs" as CGAI is known as across Canadian media and government. CGAI is a policy institute (think tank) dedicated to educating Canadians, but especially those in power, about the role Canada plays, or should play, in global affairs. Organized as a non-profit and funded by donations, CGAI is research and publication oriented and comprised of a lean administrative staff, an advisory council of senior policy makers and influencers across Canadian government, and a cohort of 150 fellows, who are all subject matter experts. These fellows relentlessly publish in their fields of expertise, the core of which is defense, foreign affairs, and security matters related to international trade, such as food, water, and energy security. In this regard, both Dr. Perry and CGAI writ large are as well known in the circles of power in Ottawa as CFR, CATO, AEI, or Heritage Foundation are to those in DC.

This session was unstructured, frank, honest, and completely unbounded, and we were joined by Operations Manager (and Fellow) Charlotte Duval-Lantoine, who recently published a monograph on Toxic Leadership Culture and Gender Integration in the Canadian Forces, but also produces the Defense Deconstructed podcast with Dr. Perry, available online at CGAI.ca. Chatham house rules aside, it would be much better use of your time to read or listen to the vast array of publications available on the CGAI website free of charge to get a much more erudite take on Canadian issues than to read here what could recalled from my notes. Our discussions ranged from Artic icebreakers and Chinese balloons, to Canada's defense budget, to how the political and economic climate affects military recruitment, and, of course, Ukraine.

Examples, for servicemembers and their families, finding a family doctor can take years, so frequent moves, even those within Canada, are challenging. Most home mortgages in Canada are written for 5 years or less, with variable rate adjustments EACH YEAR as the norm. Professional licenses often do not carry across provincial borders, again impacting servicemember spouses and therefore retention. The overall regulatory burden is a problem, for example, Ms. Duval-Lantoine, born and raised as a French citizen, still had to "prove" her French language skills, by examination, to obtain resident privileges in Quebec. The CAF are up to their gills with fully funded vacancies, but can't find a way to fill the billets and these issues don't help, especially when industry is hiring. While the military is reasonably well considered, there isn't a strong sense of the military being a noble profession in Canadian society at large and the services themselves get no funding for service specific recruiting, all recruiting is top level "all services". Quite interesting for us to learn how little military and defense issues impact Canadian elections, so little, in fact that they aren't really significant election issues at all. The voters feel that Canada is surrounded by three oceans and the US military, so security really isn't on their minds. Even major scandals, like the Somalia incident of the 1990s or the recent sexual misconduct firings of multiple flag rank officers ever became national election issues, unlike the economy, healthcare, and housing. Covid recovery and the slow economy is also impacting military recruitment, despite the CAF being chronically short of troops; fewer than 10% of

uniformed CAF servicemembers live in base housing, but private rents are escalating out of control for them and we already discussed private mortgages. On top of all of this, the CAF is in need of recapitalization for major equipment while the government is looking to trim the defense budget to be released later in March. With a military-industrial system designed to supply slow paced small efforts like contingency operations in Afghanistan, with what has already been shipped to Ukraine, Canada has maybe two weeks of artillery ammunition at full war consumption with little capacity to rapidly produce more. Again, I highly recommend perusing their website for a wide array of publications and podcasts, many of which are with big players in Canadian defense and security matters.

Day 2 - Tuesday, March 7

National Defense Headquarters Carling

Recently Canada engaged in a BRAC of sorts, relocating more than 42 Department of National Defense (DND) and Canadian Armed Forces (CAF) office locations around Ontario into seven locations near Ottawa, with the centerpiece being a $800M investment in acquiring and retrofitting the former Nortel Networks global campus into the new "Canadian Pentagon" called the National Defense Headquarters Carling campus. The relocation of almost 9,000 employees to this headquarters was called "the largest office move ever in Canada". The central office in this sprawling site of 11 buildings was the location of our visit. Ironically, it was Chinese industrial sabotage which prompted the decline and bankruptcy of Nortel as we arrived with images of spy balloons still dancing in our heads.

As we settled into what literally was an executive board room, but now is where CAF Joint Chiefs level briefings are held, we were greeted by our host, Major General Colin Keiver, the Deputy Commander of the Royal Canadian Air Force, who, like Gen. Burda, began his career flying C-130s before taking on increasingly significant leadership roles. We begin with a quick overview of challenges facing the Canadian Armed Forces before we moved into a series of presentations covering the individual branches, NORAD, Canadian Operations, and NATO/Ukraine.

Much of the organizational structure, chains of command, and force postures are available online, hopefully the attached handouts remain connected to this report. The most obvious issue facing the CAF is their ability to remain competitive with industry for recruiting

and retaining servicemembers, especially in aviation. The Royal Canadian Air Force is short 2,000 fully funded position, which might not seem huge, but understand the entire Canadian military including reserves is about the size of just our Marine Corps. CAF has an interesting problem in that they have money for people, but no people, and are resource constrained for equipment and ammunition, despite what they have stockpiled being handed over to Ukraine. Canada spends roughly just under the NATO encouraged 2% of GDP on defense and rumors are that the budget to be released later in March will be looking for further cuts on CAF spending. Like the US, Canada leans heavily on reserve forces, although Canada has no reserve only bases, reservists and active duty serve side by side with the only way to tell them apart is that the reservists are almost always part time. These experienced service members are being hollowed out by challenges from the private sector, as we discussed at CGAI on Monday.

Presenter #1- Lt. Col. Steve Buchle, NORAD forward element

Canada has committed to billions in NORAD capabilities upgrades over the next 5-20 years, including new sensors, more refueling aircraft, advanced missiles for interceptors, and infrastructure in the North. It is shorter to fly from Toronto to London than it is the RCAF alert base in Arctic Nunavut and to fly as far south from Toronto would take you to Bogota, Colombia. RCAF deploys fighters to more northern bases when Russia moves their bombers, but hypersonic missiles have changed the speed of reaction for NORAD. Russian bombers can launch these missiles from over their own bases and still hit DC, NYC, or LA, leaving little time to react, which brings us back to the billions in new investment, much of which is intended for cloud computing/artificial intelligence decision making tools in addition to sensors and weapons.

Four Pillars of Polar Layered Defense

- Domain Awareness (sensors)
- Information Dominance (cloud networks)
- Decision Superiority (AI/realtime data)
- Global Integration (NorthCom/EuCom/IndoPaCom or New Zealand to Canada)

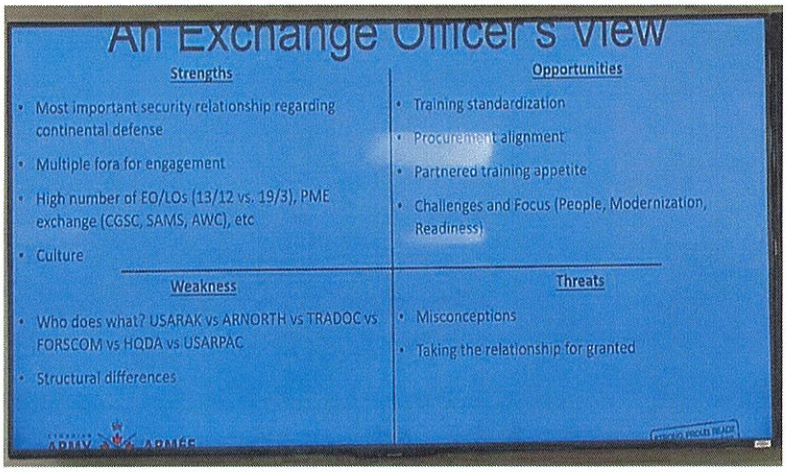
Presenter #2 - Lt. Col. Vincent McCleod, Canadian Army (see attachment)

The Canadian defense policy calls for the Canadian Army to be strong, secure, and engaged, but faces the same issues as the sister services of competing with industry for people, while competing with rest of government for budget space. For decades, the Army has largely overlooked homeland defense (why bother with the US Navy on both oceans) and built an expeditionary ground force designed as much for peacekeeping or disaster deployments as major combat operations under NATO. Unlike smaller NATO allies who have decided to focus their efforts on niche military support services, Canada has attempted to do it all, just a little, while being heavily engaged in deployments around the globe and the strain is telling.

Presenter #3 - Lt. Col. James Vansandt, US Army (on exchange assignment)

Col. Vansandt shared with us fellow Americans some of what he had learned on his exchange duty with the Canadian Army and how true it is that while we appear the same, its

more often than not an apples to oranges comparison, but the significance of US-Can military relationships is more than worth the effort to bridge the gap. The US wants partners, Canada needs partners and partners have to understand each other to benefit both sides.



Presenter #4 – Lt. Col. Chelsea Baybrook, CJOC (see attachment)

CJOC is the Canadian Joint Operations Command whose role is to anticipate and conduct Canadian Forces operations, and develop, generate, and integrate joint force capabilities for operations. Basically, CJOC is the unified command which operates Canadian forces in action, similar to one of our own geographic combatant commands like CentCom, only with worldwide responsibilities. It is one of two unified commands, with the other being Canadian Special Forces Command. As the recurring theme goes, CJOC has personnel gap challenges with the operating tempo leading to losing experienced members just as their skills are most needed. Driving this is the political will for Canada to engage in humanitarian efforts everywhere, while simultaneously reducing its footprint everywhere to focus on Ukraine. A clear sign of focus is that CJOC has three planning cells, one for Canada, one for Europe, and one for everywhere else. At the same time, Haiti is regressing towards civil war and CJOC is awaiting decision by the PM if/when to deploy there, given Canadas history (note: as of late March the decision has still not been made to deploy)

Presenter #5 – Lt. Shane Myatt, Ukraine Desk, Strategic Joint Staff

Nearly 1 in 40 Canadians have Ukrainian ancestry, so this is a big deal, Canada recognized an independent Ukraine almost from the beginning of the end of the USSR and has had military to military relations since 1993. Canada deployed troops to Ukraine on training missions in 2015 and 2019 (Unifier), providing non-lethal training in areas like casualty care and engineering, but shifted after the invasion of Crimea to warfighting skills, including sniper training. In the beginning, CAF taught Ukrainian soldiers on western mission command techniques, but discovered they were being prevented from institutionalizing them by the older officer cadre familiar only with Soviet style methods. This changed quickly after Crimea was invaded. Unifier 2022 focused on building institutions and operational use of the lethal aid now

being supplied. Future Unifier programs are focusing on what a "win for Ukraine" would look like, given the red line threats by Putin. An oft overlooked concern is "donation fatigue", when will it come and can we build up Ukraine to stand on its own before that? Will it come before Russian capacity wears out?

Presenter #6 – Cpt Wade Carter, Naval Strategy, Royal Canadian Navy

We received an abbreviated version of a paper on strategic competition with China Cpt Carter recently presented at a naval conference in Japan, which was attended by China. He talked about how the history of Great Powers interactions of the past are not always applicable to the one-man regimes in China and Russia. In some ways they do, what Russia is currently doing with their nuclear posture and saber-rattling is exactly from the old Soviet playbook. The difference is that these signals used to be hidden from the public, but when the public sees them, they panic and don't understand the history of these kinds of signals. Putin's Russia wants to be disruptive and to tear down the global rules set in place after 1945 by picking at the edges of their former empire and will likely become more disruptive as they continue to decline towards irrelevancy. China wants to rewrite the global rules to benefit themselves and are developing a global reach (nuclear weapons, espionage, belt and road, carrier aviation) in order to defend their regional dominance.

AUKUS discussion

This is a tri-lateral security pact between the US, UK, and Australia. Under this pact, the US and UK will develop a nuclear submarine for the Australian Navy. Canada was excluded from this pact, although the reason is that Canada has shown no interest in acquiring nuclear submarines, Canada knows they could enter if they chose, so there is no lasting offense taken, however, the issue is that some Canadian companies involved with the project have NDAs which complicate them also working with Canadian Forces. (Note, President Biden delivered remarks on AUKUS the following week)

Closing Remarks – MG Keiver

1. Integration: RCAF must integrate with the USAR or it can't deliver on mission
2. Inclusion: Must create a safe and respectful culture in the workplace
3. Modernize: Be agile, scalable, rapidly deployable, versatile, and relevant
4. Engage: Deter first, but be ready to fight and win

U.S. Embassy ca.usembassy.gov/embassy-consulates/ottawa

Ambassador David Cohen welcomed us to the Embassy on behalf of the Secretary of State with his full country team present. As he had another public event scheduled later, the Ambassador decided to have our Q&A session at the beginning, with his aide from the Defense Attaché Office reading off the questions we had sent him so that he could provide a fuller answer from his binder of notes. His favorite experience as Ambassador has been meeting "real people" where they live and work in hundreds of community events. When asked about the announced forthcoming visit to Ottawa by President Biden, the Ambassador explained that these summits are handled mostly by the White House itself, he would be available to support as needed, so he wasn't able to provide much insight into what would be discussed by the Prime Minister and President, but he did pass along the four pillars of President's Canada agenda. First, to rebuild trust in America. Second, to reaffirm responses to climate change. Third, for Canada and the U.S. to "build back better" and finally, to demonstrate to the world the power and strength of the US/Canada relationship. On this note, the Ambassador had to leave, but left us in the hands of his country team and the panels they had setup for us on Arctic issues.

Panel I: Arctic Security

- Pierre Leblanc, Canadian Army, retd
- Erik Furu, Royal Norwegian Embassy
- Sophie Robidoux, Department of National Defense

Highpoints, more than 10% of Norwegians live and work in the Arctic and they form the Eyes of NATO in the North against Russia. Russia is passing the chair of the Arctic Council to Norway this year. Nobody expects any issues as Russia can't really do anything to mess this up. Last summer, NATO announced its intention to locate the NATO Climate Change and Security Center for Excellence in Montreal. This COE will be a platform through which both military actors and civilians will develop, enhance, and share knowledge on climate change security impacts, allowing them to build required capabilities and best practices and contribute to NATO's goal of reducing the climate impact of our military activities. Canada will bring its unique knowledge and abilities across a range of relevant sectors to the functioning of the COE. Through the cooperative efforts of its participants, the work of this COE will enhance the security of Canada, NATO Allies and partners, and people around the globe.

Panel II: Economics and Trade in the Arctic

- Jim Rigassio, US Embassy, Commercial Affairs
- Richard Riley, US Embassy, Economic Affairs
- Robert Asselin, Business Council of Canada

Despite the tremendous natural resources such as, fish, minerals, rare earth and otherwise, exotic metals, and petroleum deposits all exist in abundance in the Arctic, the ability to bring those resources to market is extremely challenging, if not economically impossible at this time, due to the distances, the terrain, and the lack of any kind of infrastructure. Recently the Embassy hosted the Northern Lights trade show of US companies interested in doing business in the Arctic regions with excellent participation. US-Canada business relations are as tight as they have ever been, but that isn't to say there aren't friction points. The Keystone XL pipeline cancellation is certainly one of these, but there are others, such as concerns over Canadian softwood imports, Great Lakes fishing rights, shared waterways and pollution, sometimes it's acid rain from American coal plants affecting Canada, other times it's selenium from Canadian mines leeching into US water supplies. The key point is that the new USMCA treaty has resolution mechanisms built into it to prevent these kinds of friction points from impeding the continued flow of goods and services nearly seamlessly across our shared border.

Panel III: US-Canada Relations

- Greg D'Elia, US Embassy, Political Affairs
- David Perry, Canadian Global Affairs Institute (and our friend from Monday)
- Col. Chadwick Sterr, US Embassy, Senior Defense Attaché

Both the Canadian people and its institutions are slowly waking up to the threat posed by China and their attempts to break the "rule of law" the Globe has operated under since WWII. Universities are starting to see the downside with admitting massive waves of Chinese students. Recent revelations of Chinese interference in Canadian elections has created a buzz in the media, but this may be too little too late as China has been running loose in Canada for a long time. Canada was not invited to join the AUKUS program, but mostly because Canada had no plans for nuclear subs, Canada knows "the door is never shut on Canada" if they change their minds.

Day 3 - Wednesday, March 8

Royal Military College Saint-Jean cmrsj-rmcsj.forces.gc.ca

We drove through the lovely Montreal suburb of Saint-Jean-sur-Richelieu to visit one of two schools of the Canadian Defense Academy or Academie Canadienne de la Defense, now that we are in Quebec. Similar to our own service academies, these degree conferring institutions of higher learning are designed to take high performing high school graduates interesting in serving as military officers and turn them into bilingual leaders imbued with exemplary values capable of serving with excellence in the Canadian Armed Forces.

Generally, men and women interested in earning a commission will attend either here or at the larger Royal Military College of Canada in Kingston, Ontario, in British Canada (where we had intended to visit in 2022). Prospective students must commit to military service first and after rigorous examination to prove themselves academically capable of the work, can apply to either Academy into one of 20 different academic fields, some, but not all of which align to the available career fields in the CAF, which coincidentally also number 20. Both academies are all service, with cadets destined for the Army, Navy, or Air Force all attending classes side by side. Most students who chose RMC Saint-Jean, but not all, are from French Canada, but as bilingualism is a cornerstone of the program, while classes are taught and assignments are given in the preferred language of the student, outside the classroom, the official language of the school switches from English to French in the middle of each month, with severe consequences (e.g. runs or push-ups) for the woeful student who addresses the faculty or staff in the wrong language.

The staff and faculty are a mixture of active-duty uniformed military and civilians from academia and includes two Americans at this time. Foreign students, such as the Republic of Korea Army cadet whose dorm room we visited, are a part of every class and have recently come from places such as Poland, Belgium, Austria, and Colombia. As for the last one, Canadian peacekeeping commitments in Latin America have sparked ideas of adding a Spanish program. As all Canadian cadets are servicemembers first, tuition is free, but room and board are deducted from their military pay. Students who do not complete the first year, whether by their choice or not, can return to their service branch honorably to serve out their commitment as enlisted soldiers, sailors, and airmen. If they stay past the first summer, but later leave or are asked to leave, they also have the option to walk away from the military entirely with a buyout of their entire tuition bill or can return to serve as enlisted by repaying just their second-year tuition.

When they complete their course of studies and graduate, they commit to serve the CAF for five years.

The programs themselves would be unsurprising to anyone familiar with the courses of study at West Point, Colorado Springs, Annapolis, or New London with programs heavy on math, science, engineering, and other militarily important subjects, but there are degrees offered in business, economics, history, political science and even psychology; each cadet works with the administration to select a course of study which meets both the students capabilities and interests, as well as those in need by the service the student has joined. An army engineering cadet is likely to major in, you guessed it, engineering, but a future Air Force lawyer might major in history, but she can choose chemistry, its largely up to the cadet. Currently, the only degree conferred at Saint Jean is in International Studies, but a new program is almost ready to begin accepting students in Geo-Politics and Climate Change. Students interested in the other 19 programs, and all graduate and doctoral level students in all curricula must attend the RMC of Canada in Kingston. As with our service academies, student life is rigorous and highly structured, but with a focus on the four pillars of academics, military knowledge, bilingualism, and physical fitness with plenty of time for classes, sports, drilling, even exchange programs and field exercises, but little else to spend their leftover pay on, even if they had the energy to do so.

Resident at RMC Saint-Jean is the Osside Profession of Arms Institute which provides senior non-commissioned members of the CAF with professional development courses at each level of their careers, with most all senior non-comms having cycled through the academies for progressively higher competencies relevant to their responsibilities, especially those in or destined for staff positions, much like what NDU offers at the National War College for higher grade officers and NCOs expected to be in a position to influence senior leaders, such as CAPSTONE, KEYSTONE, and PINNACLE. The Osside Institute cycles through as many as 1500 lower rank NCO and up to 30 or so higher rank NCO each year. These courses do provide continuing college credit towards a degree. We made our way back to the bus by walking through the student living and working areas while the students themselves were still in class.

Ultra Electronics Systèmes de Communication Tactiques www.ultra.group/ultra-tcs

After lunch overlooking the partially frozen Richelieu River, we rushed to our last stop as the bus made its way to a relatively non-descript light industrial area next to the airport to meet our last host of the trip, Ultra Communications, a company we knew little to nothing about and had no way of expecting how much we would enjoy visiting. We assembled inside, clearing security and inspecting what appeared to be a large collection of old radio equipment in the lobby, (more on that later), we donned anti-static smocks (each person must button exactly three buttons to be legally permitted in the lab area), we began to understand what was taking place here in this building behind the cafeteria and mostly open cubicles next to the conference room in which we were getting dressed. Our host, the Director of Solutions Development, and his team of mostly electrical engineers took us in the lab area of the facility to show us the latest radio gadget they are working on under contract for the US Navy, the Amphibious Tactical Communications System (ATCS). The ATCS project seeks to provide state-of-the-art, long-range wireless communications capability between the Navy's L-Class (Landing Craft) Ships and shore systems operated by the Marine Air-Ground Task Force (MAGTF), such as those we met on our January conference in Savannah. As we moved from each to the next engineers station, we came to realize that Ultra has being making military radios for decades and this latest device for the US Navy was replacing another older Ultra product to ensure interoperability with other Ultra systems already deployed across the US Department of Defense, including the US Army, US Marine Corps and US Special Forces, but also in the Canadian Department of National Defence (DND), UK Ministry of Defence (MOD), and the defense and security agencies of allied nations around the globe, including NATO partners.

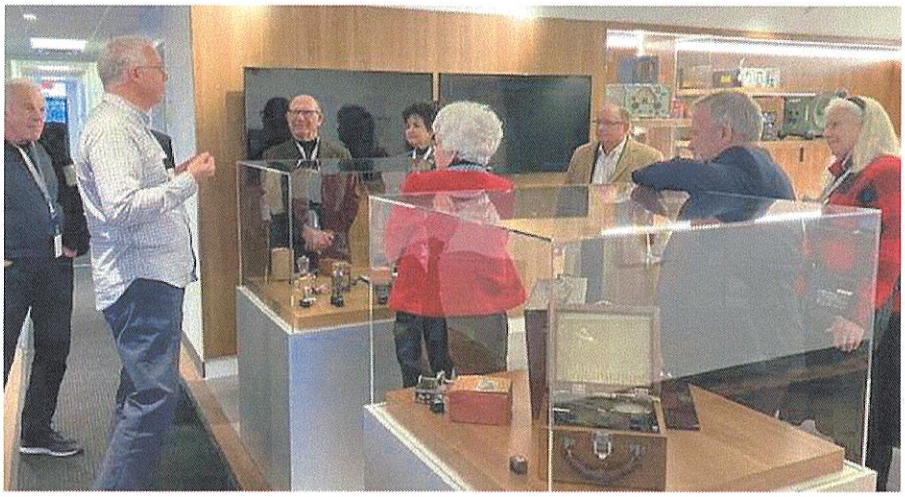
But these are not just radios as you would think of walkie-talkies or trucker CBs with rectifiers, crystals, and modulators. These suitcase-sized "radios" modules are actually software-defined, multi-channel, multi-band, multiple-in and multiple-out integrated circuit computers which are capable of intelligently self-forming secure and jam resistant mesh networks with other radios across the battlefield. They act more as computers capable of detecting, classifying, and sending radio frequency data across a secure network of other computers pretending to be radios, in fact, while they are capable of sending and receiving voice and video signals, most of the time they are passing data from sensors to other platforms. You don't use these radios with a headset or a microphone, you use a laptop with a web browser, that's how much computer these radios are. As we left the engineering space and moved towards the assembly area, we saw a demonstration of the modularity of these radio, as complete systems were being packaged for delivery to the USMC after passing inspection. The same radio module as before was here attached to a mast antenna with a transmit/receive dish for use by Marines after a landing for communications to HQ still on-board ships offshore, but also to other Marines ashore, in the air, and by satellite, anywhere in the world. The same radio is issued with the Patriot air defense system like those currently being prepared for delivery to Ukraine. These Orion x500 radios could even be raised aloft by drone, with a power/data cable tethered to a vehicle. Keep in mind that these devices are more than just radios but are themselves signals sensors capable of collecting and processing electronic intelligence. Here is a photo of an older generation model.

Deeper into the building, workers were assembling the various components into the final product, while other employees conducted testing and inspection before packaging for customer acceptance and delivery; the target being three complete systems per workday ready to ship out. It was hard to believe that what looked like any other distribution warehouse from the outside was designing, building, testing, and delivering next level military equipment. Ultra doesn't even build most of what's inside, much of which is commercial off the shelf integrated circuit boards, the "special sauce" which Ultra provides is the proprietary software and the radio frequency engineering expertise to "tweak" to perfection each device before it leaves the facility, so that the end user knows it's just right, right out of the box; no quality control sampling here, each device is hand tested and optimized before being approved for sale.

We ended the research lab/assembly/testing facility and re-entered the office area to wrap up (or so we thought) our tour with a videoconference with Ultra's VP of Business Development who provided us an idea of what its like competing under DoD acquisition rules in high tech areas where the technology moves faster than the contract specifications can, but that government is moving towards more of a try-decide-buy model to counter this. We also caught a glimpse into other product areas of the larger UK based Ultra Group, including a new troposcatter radio system for the US Army. Short for tropospheric scatter, this technology uses the particles that make up the Earth's atmosphere as a reflector for radio signals. The signals are aimed just above the horizon in the direction of a receiver station. As they pass through the troposphere, some of the energy is scattered back toward the Earth, allowing the receiver station to pick up the signal, creating a secure communications network without the need for cellular towers or satellites. This may come in extremely handy in places like the Indo-Pacific, where islands may be 200-250 miles apart, making line-of-sight radio comms difficult, but in addition to the battlefield, these systems can be used in crisis response scenarios like natural disasters, where immediately re-establishing reliable communications may otherwise be impossible. Taken together with the tour, we ended the VTC left impressed with how impactful this small and agile engineering firm from Montreal was as a contractor to the US defense sector, little did we know that what seems like new can indeed sometimes be very old.

Wrapping up, we casually stopped by the museum of relics on our way out. You see, what is known as Ultra Tactical Radio Systems today is a descendent of what used to be Marconi

Canada, yes, that Marconi. It was Marconi himself who sent the first understandable radio signal across the Atlantic (from the UK to Canada) in 1901. It was a Marconi Canada made set in Newfoundland which received the Titanic's SOS signals in 1912. By the First World War, Marconi Canada was firmly settled as a maker of military radios, so I guess it shouldn't be surprising at all what they are making here today. I can only say to those members able to experience the hidden Titan Museum tour and its mesmerizing docent on our last visit to Vandenberg AFB, that this corporate radio museum was equally as interesting and unexpected. You see, our host happens to also be one of the companies longest tenured employees, the resident collector/custodian of these artifacts and he was most proud to walk us through the history and significance of each one. Luckily for us, this being our last event, we were able to oblige and are forever glad we did, as his history lesson was easily an off-the-book trip highlight. Let me just say we stayed and listened to him until we were holding security up as all the other employees had left the building and he needed to collect our badges before locking up. Not a bad way to end our conference, by closing out the joint.



National Defence / Defense nationale

CANADIAN ARMY

THE C

Our Strength – founded upon our soldiers, our families
Our Presence – we have an impact across Canada stemr
Our Culture – a premium on leadership, empowering s

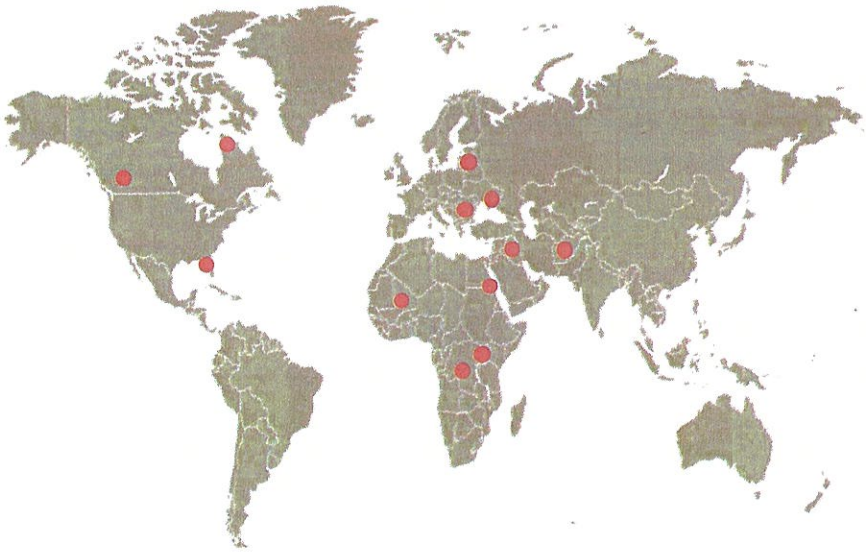
Force Generation

- Live-fire training at the combat team level (level 5) is the minimum level to develop combat proficiency in the most demanding of training environments. It is the vital ground for training.
- The Army trains to fight at the brigade group level, enabled by an allied, coalition, or national division or joint task force headquarters.
- Generate – scalable, agile, and responsive land forces.

Challenges

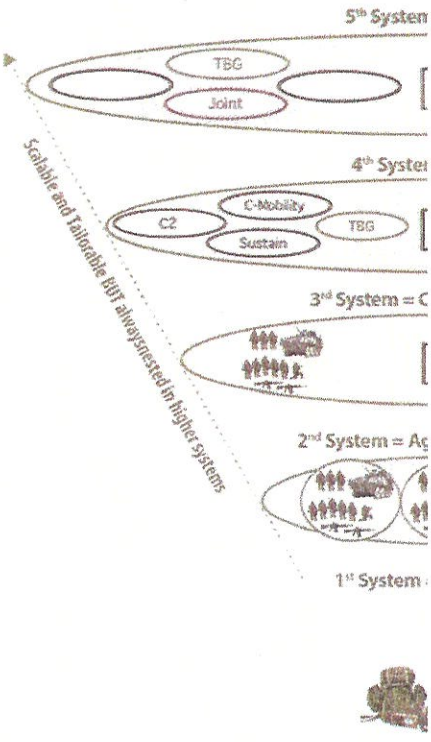
- **Professional Military Conduct and Culture Change**
- Managing capability gaps as we introduce new capabilities.
- Growth through recruiting and retention.
- Rapidly rebalancing the Army for concurrency of operations.
- Achieving integration and interoperability with key partners

Operations – On average, 1060 soldiers deployed on 15 expeditionary and 6 domestic operations in 2022.



War, conflict, and competitic
psychological presence amc
create, and enable the use
internationally. The Army wi
meet Canada's defence obj

Land Power: "A S

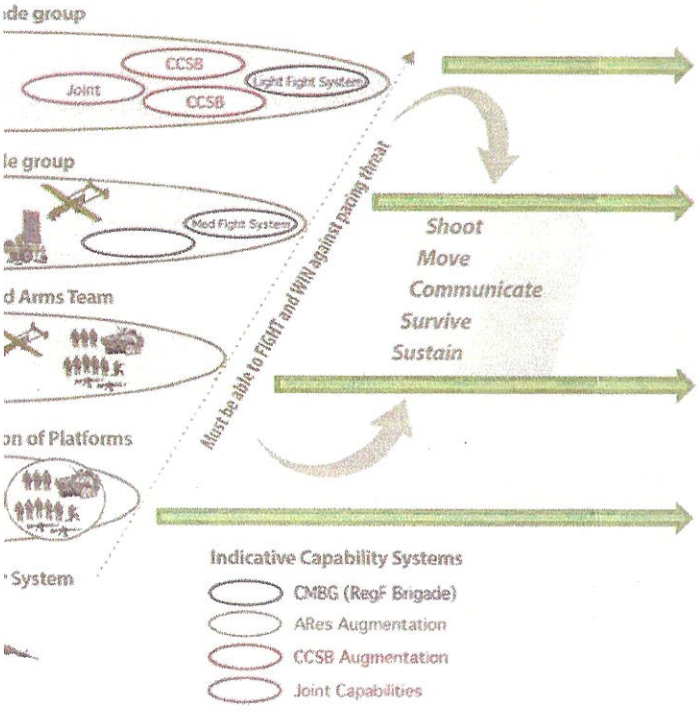


ıDIAN ARMY

l our friends.
from our nation-wide footprint.
ʻdinates, and fostering a "bottom-up" approach to problem

main a contest of human will. The ability to control ground, to have a physical and
t the population, will continue to be a strong signal of national commitment. The CA exists to
nd and joint power to meet Government of Canada objectives, both domestically and
ıtinuously modernize and evolve to generate combat-effective, multi-purpose land forces to
es across the full spectrum of conflict.

m of Systems"



5th System = Brigade Group
- 4,000 to 5,000 members
- About 1,500 vehicles
- 6 to 8 subordinate units

4th System = Battle Group
- 600-800 members
- 150-200 vehicles
- 4 to 6 subordinate sub-units

3rd System = Combined Arms Team
- 150-200 members
- 20-30 vehicles
- 3 to 5 subordinate sub-sub units

2nd System = Aggregation of Platforms
- 30-50 members
- 5-6 vehicles

National Defence / Défense nationale

CANADIAN ARMY

The Canadian Army in 2022

Mission

The Canadian Army generates combat-effective, multi-purpose land forces for employment on multiple concurrent operations in order to achieve Canada's defence objectives.

Vision

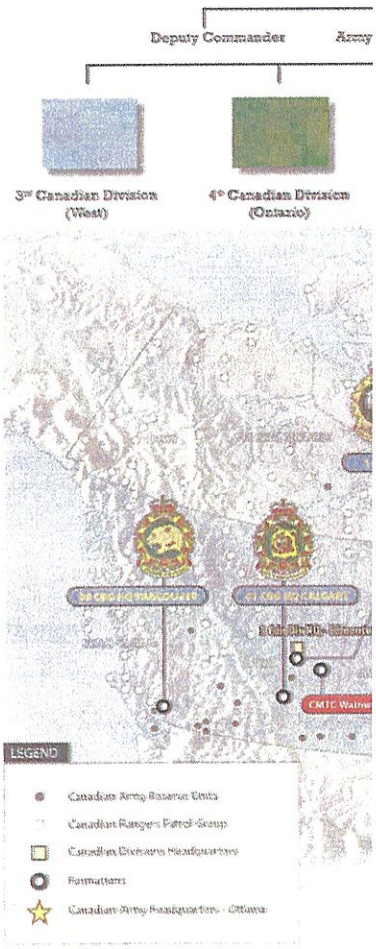
Leveraging every individual's strength in an environment that strives for inclusion, ensures mutual respect, and protects every soldier's dignity, the CA will be agile, disciplined, and innovative. It will comprise well-led, well-trained, well-equipped, well-sustained people and units, postured to succeed across the full spectrum of operations. Exploiting networked communications and pervasive data environments, the CA will excel at integrating effects with joint, interagency, multi-national, and public partners at the brigade level and below. The CA will employ adaptive dispersion – the ability to operate widely dispersed yet retain the ability to aggregate rapidly to concentrate combat power – to attain its tactical and operational goals. Using the One Army model and philosophy, the diverse elements of the CA's organization (Reg F, ARes, CR, Public Servants) will converge behind common goals in support of its mission.

Key Characteristics

- The Canadian Army's **competitive advantage is derived from its professional soldiers**.
- The Canadian Army is adaptive as individuals and as a force.
- The Canadian Army is a medium force, complemented by light and heavy capabilites.
- The Canadian Army integrates Regular, Reserve, and Canadian Ranger components.

Policy Alignment

- Defense Policy Statement 2017 – *Strong, Secure, Engaged*
- Strengthening the Army through the operationalization of the Army Reserve



Acronyms

(CADTC) Canadian Army Doctrine
(CMTC) Canadian Manoeuvre Tr
(CTC) Combat Training Centre

16 Major Equipment Fleets (17 January 2023)

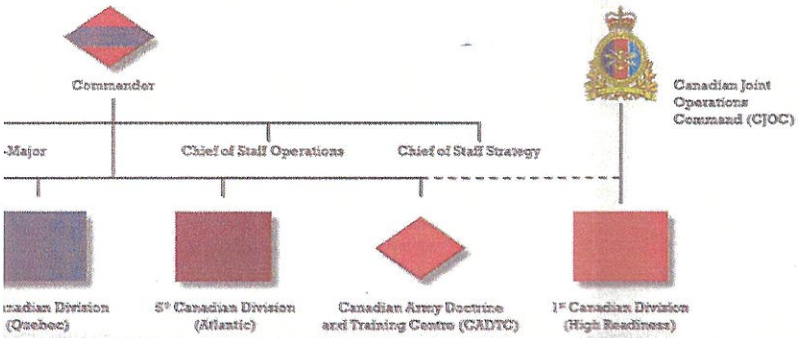
Leopard Main Battle Tank	82
Armoured Engineer Vehicle	18
Armoured Recovery Vehicle	12
Tracked Light Armoured Vehicle (all variants)	93
Light Armoured Vehicle 6.0	555
Light Armoured Vehicle Coyote	76
Tactical Armoured Patrol Vehicle	500
Car Armoured Bison	164
Armoured Heavy Support Vehicle System	48
Medium Support Vehicle System MilCOT	1296
Medium Support Vehicle System SMP	1588
Heavy Logistic Vehicle Wheel	695
Light Support Vehicle Wheel	1247
Light Utility Vehicle Wheel	877
155mm Howitzer M777	33
C3 Howitzer	93

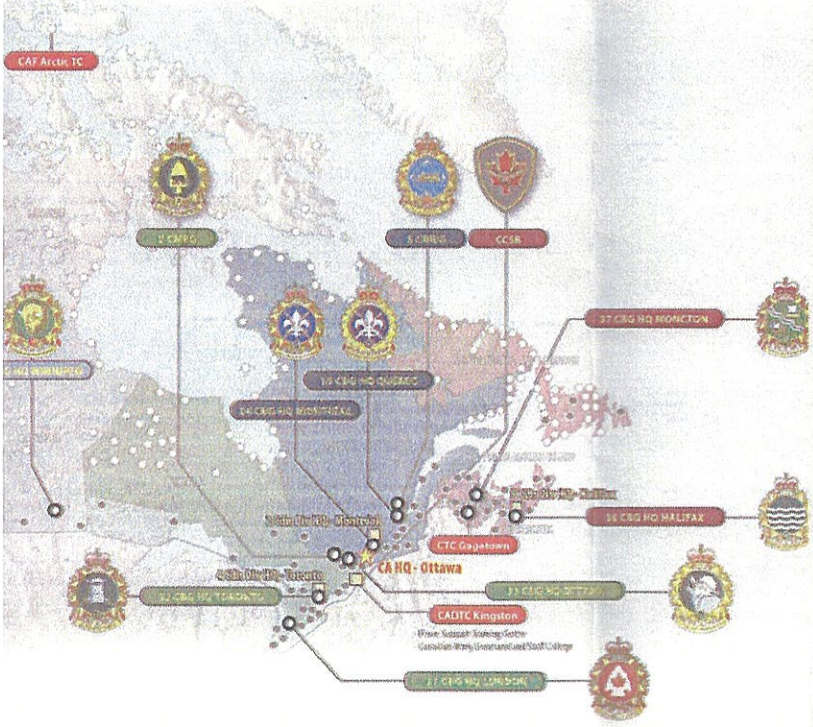
ARMÉE CANADIENNE

STRONG. PROUD. READY.
FORTS. FIERS. PRÊTS.

CANADIAN ARMED FORCES

Canada





raining Centre
Centre

(CMBG) Canadian Mechanized Brigade Group
(CCSB) Canadian Combat Support Brigade
(CBG) Canadian Brigade Group

Demographics (28 Feb 2023)

Across the Army

Female	12.5 %
Indigenous	2.6 %
Visible Minorities	12.3 %
Francophone	22.0 %
Persons with Disabilities	1.0 %

Regular Force

Female	11.0 %
Average Years of Service for NCMs	10.8 yrs
Average Years of Service for officers	12.6 yrs
Average age	33.4 yrs

Army Reserve

Female	12.9 %
Students	27.0 %
Average age	31.6 yrs
Average Years of Service for NCMs	8.4 yrs
Average Years of Service for officers	13.7 yrs
Average days of service/year (not including full time employment)	94.0
Attrition (twice the CAF average)	14.0 %

Canadian Rangers

Female	23.1 %
Indigenous (self-identified)	25.1 %
Average age	48.5 yrs
Average years of service	14.1 yrs
Average days of service/year	10.3

Public Service Workforce

Female	38.0 %
Average age	49.4 yrs
Within 5 years of retirement eligibility	30.3 %
Vacancy Rate	8.0 %

Footprint (28 Feb 2023)

Regular Force:	21,309; 4 Brigades; 63 Units
Army Reserve:	19,869 ES (17,566); 10 Brigades, 185 sub-units in 169 armouries across 117 communities
Employed outside CA:	14,212 (Personnel in Army Uniform working for non-CA organizations)
Canadian Rangers:	5,150 in 197patrols in over 220 isolated and coastal communities. Demographics of approximately 25% Indigenous (self-identified)
Public Service:	3,543, mostly outside the National Capital Region
Training:	14 schools and training centres
Real estate:	The CA provides general and specialized base support through its 21 bases to 55,000 Defence Team members

Op REASSURANCE

MTF: FFH (250)

Canada's contribution to support peace and security in Central and Eastern Europe. Since May 2014, CAF persistent presence in theatre has consisted of a Canadian Army (Enhanced Forward Presence) battle group, a RCN Maritime Task Force (HMC Ship), and an episodic Air Task Force.

Op REASSURANCE—LTF

eFP Latvia: 750

NATO commitment to support regional stability.

ATF—PRESTWICK

UK: 60 / 3 x CC130J

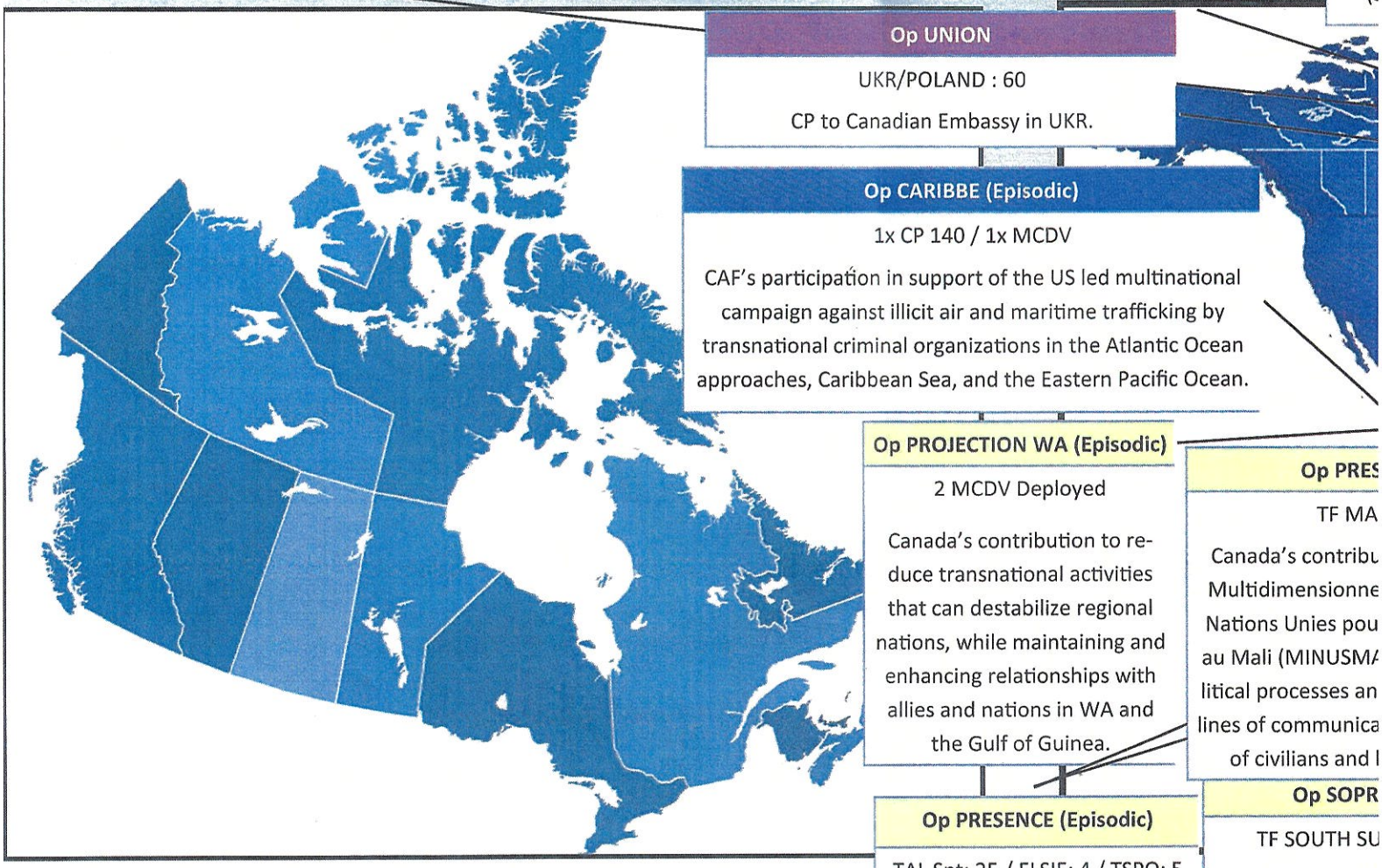
Small and agile footprint allowing for millions of

Op KOBOLD

TF PRISTINA: 5

Canada's contribution to the NATO-led Kosovo Force (KFOR). 3 logistics officers working staff jobs, one senior NCO who conducts customs.

Car
Secu
(SFI
the F
2
Ele
NS
(3



Op UNION

UKR/POLAND : 60

CP to Canadian Embassy in UKR.

Op CARIBBE (Episodic)

1x CP 140 / 1x MCDV

CAF's participation in support of the US led multinational campaign against illicit air and maritime trafficking by transnational criminal organizations in the Atlantic Ocean approaches, Caribbean Sea, and the Eastern Pacific Ocean.

Op PROJECTION WA (Episodic)

2 MCDV Deployed

Canada's contribution to reduce transnational activities that can destabilize regional nations, while maintaining and enhancing relationships with allies and nations in WA and the Gulf of Guinea.

Op PRES

TF MA

Canada's contribu
Multidimensionne
Nations Unies pou
au Mali (MINUSMA
litical processes an
lines of communica
of civilians and I

Op PRESENCE (Episodic)

TAL Spt: 25 / ELSIE: 4 / TSPO: 5

CAF deployment of Tac Airlift Det to assist the UN's Regional Support Centre (RSCE) in the sustainment of on going Ops / ELSIE: deployment to Ghana to assist with gender mainstreaming initiatives. / TSPO: Training Support to Peace Operations.

Op SOPR

TF SOUTH SU

Canada's contrib
UN Mission in S
(UNMISS) throug
tion of civilians,
implementation c
ization Agreemer
Process and moni
tigating, and repc
lations of humar

TASW	Op NANOOK	Op LENTUS
ALEA	Op LIMPID	Op PALACI
National Commemorations		Op LASER
SAR (Aeronautical & Maritime)		Op VECTOR

North America

Latin America and Caribbean

Eurasia

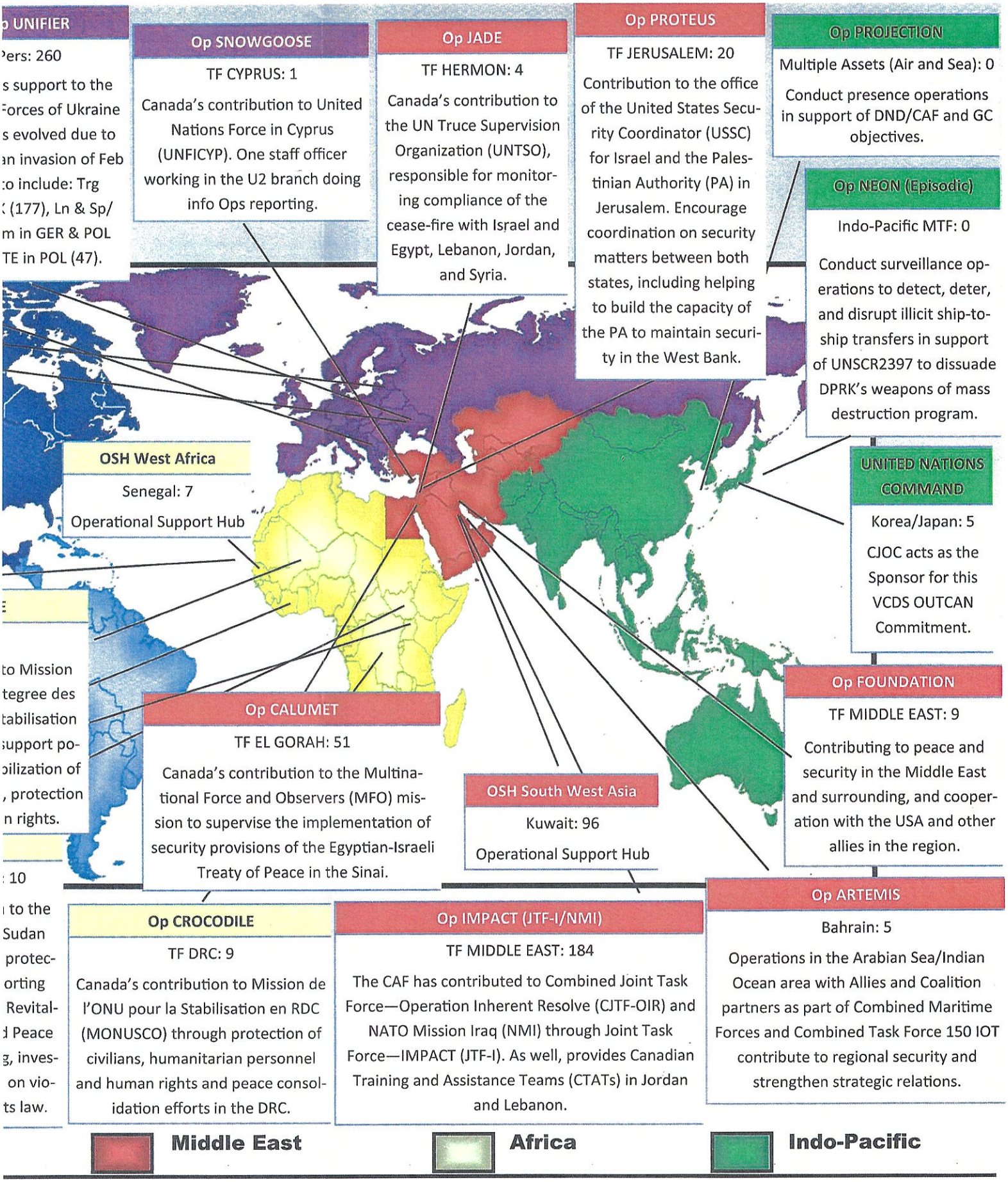
International & Domestic

CJOC

OPERATIONAL RELEVANCE

National Défense

Defence nationale



Op UNIFIER

ers: 260

s support to the
orces of Ukraine
s evolved due to
an invasion of Feb
o include: Trg
(177), Ln & Sp/
m in GER & POL
TE in POL (47).

Op SNOWGOOSE

TF CYPRUS: 1

Canada's contribution to United Nations Force in Cyprus (UNFICYP). One staff officer working in the U2 branch doing info Ops reporting.

Op JADE

TF HERMON: 4

Canada's contribution to the UN Truce Supervision Organization (UNTSO), responsible for monitoring compliance of the cease-fire with Israel and Egypt, Lebanon, Jordan, and Syria.

Op PROTEUS

TF JERUSALEM: 20

Contribution to the office of the United States Security Coordinator (USSC) for Israel and the Palestinian Authority (PA) in Jerusalem. Encourage coordination on security matters between both states, including helping to build the capacity of the PA to maintain security in the West Bank.

Op PROJECTION

Multiple Assets (Air and Sea): 0

Conduct presence operations in support of DND/CAF and GC objectives.

Op NEON (Episodic)

Indo-Pacific MTF: 0

Conduct surveillance operations to detect, deter, and disrupt illicit ship-to-ship transfers in support of UNSCR2397 to dissuade DPRK's weapons of mass destruction program.

OSH West Africa

Senegal: 7

Operational Support Hub

UNITED NATIONS COMMAND

Korea/Japan: 5

CJOC acts as the Sponsor for this VCDS OUTCAN Commitment.

Op FOUNDATION

TF MIDDLE EAST: 9

Contributing to peace and security in the Middle East and surrounding, and cooperation with the USA and other allies in the region.

Op CALUMET

TF EL GORAH: 51

Canada's contribution to the Multinational Force and Observers (MFO) mission to supervise the implementation of security provisions of the Egyptian-Israeli Treaty of Peace in the Sinai.

OSH South West Asia

Kuwait: 96

Operational Support Hub

Op ARTEMIS

Bahrain: 5

Operations in the Arabian Sea/Indian Ocean area with Allies and Coalition partners as part of Combined Maritime Forces and Combined Task Force 150 IOT contribute to regional security and strengthen strategic relations.

Op CROCODILE

TF DRC: 9

Canada's contribution to Mission de l'ONU pour la Stabilisation en RDC (MONUSCO) through protection of civilians, humanitarian personnel and human rights and peace consolidation efforts in the DRC.

Op IMPACT (JTF-I/NMI)

TF MIDDLE EAST: 184

The CAF has contributed to Combined Joint Task Force—Operation Inherent Resolve (CJTF-OIR) and NATO Mission Iraq (NMI) through Joint Task Force—IMPACT (JTF-I). As well, provides Canadian Training and Assistance Teams (CTATs) in Jordan and Lebanon.

to Mission
tegree des
tabilisation
support po-
ilization of
, protection
n rights.

10
to the
Sudan
protec-
orting
Revital-
Peace
g, inves-
on vio-
ts law.

Middle East **Africa** **Indo-Pacific**

COIC Current Operating Picture

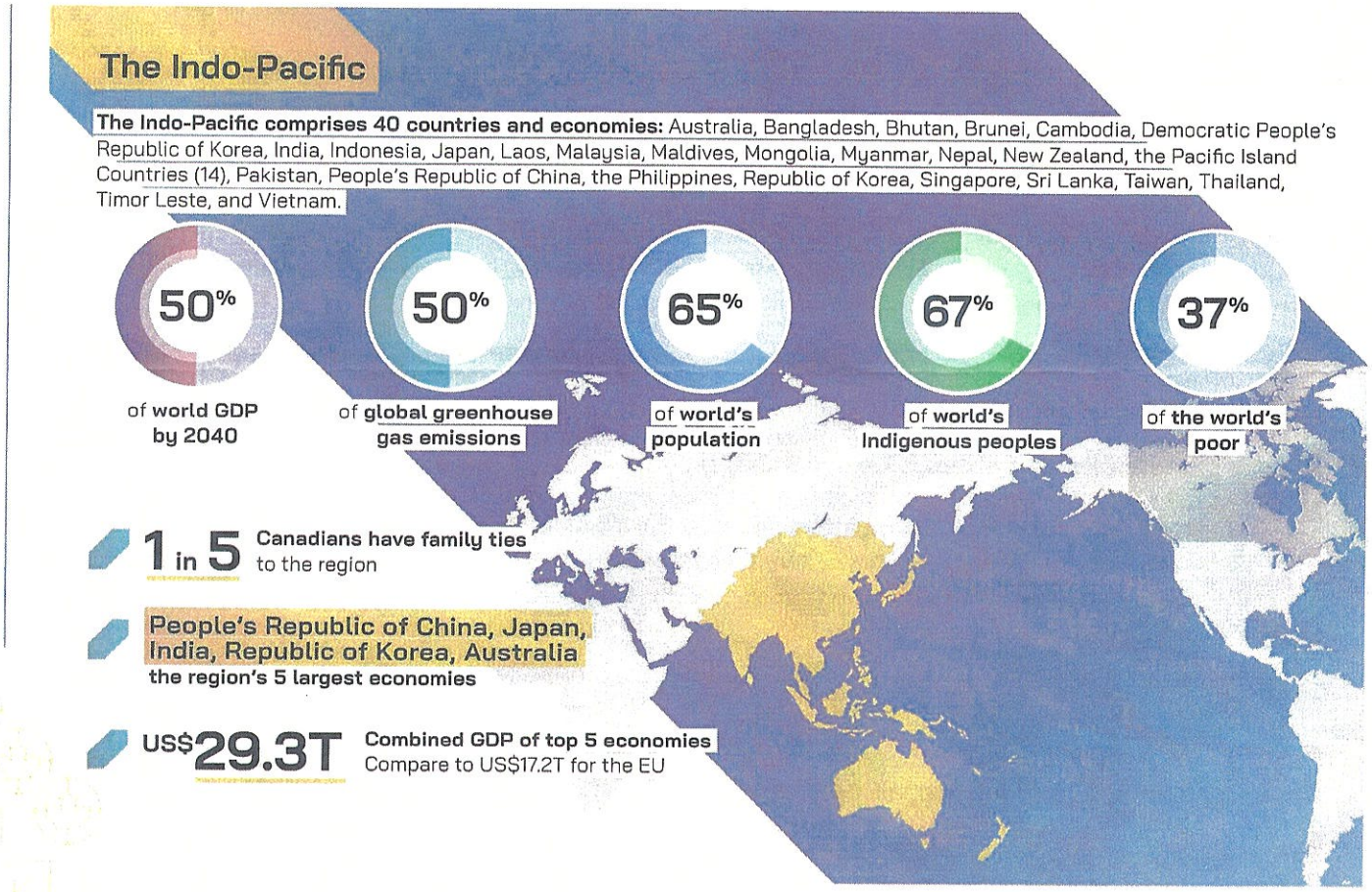
PERTINENCE OPÉRATIONNELLE

Canada

Canada's Indo-Pacific **Strategy**

Canada's Indo-Pacific Strategy presents a comprehensive road map for the Government of Canada's regional engagement over the long term. Fundamentally, the strategy commits Canada to expanding and deepening its presence and partnerships in the Indo-Pacific, as well as to reinforcing a free, open, sustainable, and inclusive order in the region.

The Indo-Pacific Strategy will be directly supported by 24 new funded initiatives across 17 departments and agencies, totalling almost $2.3 billion. In addition to these newly announced initiatives, departments and agencies across the Government of Canada will also support the strategy through existing engagement and programs.



Partners and Allies

Canada's Indo-Pacific Strategy will scale up cooperation with key partners within and outside the region including India, Japan and South Korea, ASEAN members, Five Eyes partners and others.

China

Canada will be clear-eyed in its engagement with China, challenging it in areas of profound disagreement while pursuing cooperation on critical global issues.

Regional Engagement

Canada will elevate its presence and strengthen its contributions to key regional forums such as ASEAN, APEC and the Partners in the Blue Pacific.

Canada

Promote peace, resilience and security ($720.6M)

The stability of the Indo-Pacific is essential to the wider global rules-based order. To strengthen its contributions to peace, resilience and security, Canada will enhance its military, cyber, and security capabilities, as well as its regional engagement with key Indo-Pacific partners across these areas.

- Enhanced military presence
- Security partnerships and capacity building
- Augmented intelligence capacity
- Cyber security and digital diplomacy

Expand trade, investment and supply chain resilience ($244.4M)

Canada will foster a more open, predictable and sustainable regional economic order by strengthening and diversifying its regional economic partnerships, supporting expanded market access, reinforcing resilient supply chains, securing productive two-way investment and promoting business opportunities in Canada and the Indo-Pacific.

- Team Canada trade missions
- Canadian Trade Gateway in Southeast Asia
- Expanded natural resource ties
- Indo-Pacific Agriculture and Agri-food Office

Invest in and connect people ($261.7M)

Canada will build on its deep, long-standing people-to-people ties with the Indo-Pacific region by investing in bolstered visa-processing capacity, increased international assistance programming and enhanced educational and research exchanges, notably through the expansion of Canadian scholarship programs.

- Bolstering visa processing
- Indo-Pacific Engagement Initiative
- FIAP-responsive bilateral programming
- Expanded SEED scholarships

Build a sustainable and green future ($913.3M)

Canada recognizes the pivotal importance of the Indo-Pacific in the global fight against climate change and environmental degradation. As a reliable energy security partner, Canada will support the region's transition to a sustainable and low-carbon future that is resilient to climate-related natural disasters, while contributing to high-quality and sustainable regional infrastructure.

- Shared Ocean Fund
- Infrastructure support
- Disaster risk and resilience support
- Sustainable environmental bilateral programming

Canada as an active and engaged partner to the Indo-Pacific ($147M)

Canada will strengthen its regional diplomatic engagement and work with partners to advance shared values and objectives. Canada will increase its diplomatic capacity in the region and appoint a Special Envoy to advance Canadian objectives more effectively and reinforce its dialogue with the region.

- Indo-Pacific Diplomatic Capacity Uplift
- Enhanced ASEAN-Canada partnership
- Asia Pacific Foundation of Canada regional efforts

This novel Electronic-Counter-Countermeasure (ECCM) radio launched the era of Cognitive Radios years before the word was even invented. This innovation was followed by the first tactical high-capacity Software Defined Radio, the GRC-245A, introduced in 1999 and used by military agencies around the world.

PUSHING THE LIMITS OF TECHNOLOGY

In 2002, the company was acquired by Ultra Electronics and is known today as Ultra Communications. Ultra launched the world's first high-capacity Software Communications Architecture (SCA) compliant radio in 2006 and introduced a dual Time Duplex/Frequency Duplex Software Defined Radio platform 4 years later. This development led the way to a "game changing" multi-mission radio which won three Built in Canada Innovation Programs (BCIP) for its revolutionary capabilities. Under the name Ultra ORION, this platform became the first production Multiple Input Multiple Output (MIMO) military radio and the first of its type to be acquired by the US Department of Defense, at last bringing 4G technologies to modern tactical networks. In 2019, Ultra lead the industry again in establishing the Resilient Machine Learning Institute (ReMI).

Ultra Communications is Ultra's center of excellence for tactical Line-of-Sight (LOS), Beyond-LOS, Satcom and Troposcatter communications and Artificial Intelligence / Machine Learning (AI/ML).

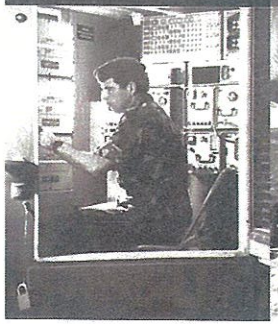
JOINT ALL-DOMAIN TACTICAL COMMUNICATIONS

ULTRA

5990 Côte de Liesse, Montreal, QC
Canada, H4T 1V7
(514) 855-6363
www.ultra.group

ULTRA AND CANADIAN MARCONI

A HISTORY OF INNOVATION



Ultra Communications is well known in the defence industry for Software-Defined Radios (SDR) that are used by military agencies in tactical applications. Our reputation is based on a legacy of innovation and entrepreneurship in radio and wireless technologies which started with Guglielmo Marconi.

ENTREPRENEURSHIP AND INNOVATION

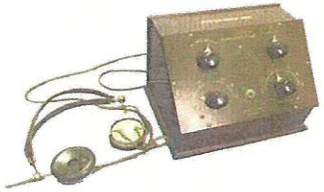
Marconi succeeded in making radio a commercial success by innovating and building on the work of previous experimenters and achieved his first success on his father's estate, in Italy, in 1895. In early 1896 at the age of 21, he travelled to London to seek support for his work and by 1897, Marconi had transmitted Morse code signals over a distance of 6 km. Later that year, he demonstrated the world's first ever maritime wireless communication over 16 km of open sea.

On December 12, 1901, using a 150 m kite supported antenna, Marconi received a message in St John's Newfoundland transmitted by a spark transmitter from Poldhu, Cornwall, England – a distance of over 3,500 km. Marconi had invented an entirely new science-based industry by integrating obscure and complex experiments in physics into the design of a reliable wireless telegraphy system. In 1902, the Canadian Prime Minister, Sir Wilfred Laurier, offered $80,000 CAN to the young inventor to erect wireless stations for communications between lighthouses, life-saving stations and ships.

The heritage of Ultra Communications can be traced to this historic agreement which led to the creation of the Montreal-based Marconi Wireless Telegraph Company of Canada Inc. in 1903.

FROM WIRELESS TO RADIO

On April 14, 1912, at 10:25 pm EST, the first distress call of the Titanic was transmitted by the ship's Marconi transmitter and received by a Marconi Canada magnetic detector at the Cape Race station in Newfoundland. By the end of World War I, wireless communications had been established as a key Command & Control technology for military applications.

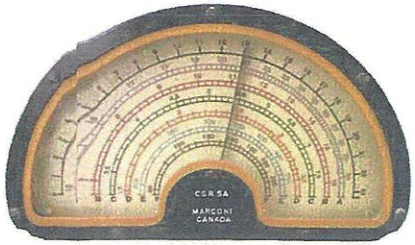


The War had fueled rapid technological development in land warfare and electronic tubes replaced spark coils as the core technology in wireless transmitters, allowing for much smaller transmitter-receiver sets. Continuing research work between 1914 and 1918 to support the Army and the Navy gave the company the lead in leveraging tube technology which was used to establish experimental radiobroadcasting tests as early as 1919. By May 1920, the company experimental station XWA had initiated the first regular, scheduled radio broadcast program in the world from its William Street facility in Montreal.

In 1925, Marconi engineers dramatically simplified receiver operations by inventing the Straight-Line Frequency Condenser which allowed frequency to be changed linearly with the rotation of the radio set frequency dial. The company name was changed to Canadian Marconi Company that year and, by 1930, employees deployed the first mobile Police communications system in the country in Winnipeg. In 1934, a ruggedized, rapidly deployable wireless communications solution was developed; it was ideally suited for transport by "canoe, motorboat, pack-horse or dog-sled."

VITAL MILITARY TECHNOLOGY

By 1945, the company had supplied a dozen different types of radio sets used in army headquarters, tactical command posts, tanks, on navy ships and in "Special Wireless Stations" along the country's coast lines. Canadian Marconi radios made a significant contribution to victory on land and at sea.



In 1956, the company became the first Canadian firm to design a complete microwave radio relay system - the Mid-Canada Defence Line. By the 1960s, transistor technology had emerged allowing Marconi to lead a joint Canada-US Defense development program and, in 1965, create the GRC-103, the first digital tactical radio-relay in the world. Based on research started in 1986, Marconi Canada commercialized the GRC-512 in 1992, a unique "Adapt & Aware" radio system.