

1. The EU AI Act: A landmark in AI regulation

LAST BATCH

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Context

- On 9 December 2023, the European Parliament and the Council of the European Union arrived at an agreement on **the European Union Artificial Intelligence Act (EU AI Act)**.
- **With this, the EU has become one of the first AI regulators in the world**

Context

- The Artificial Intelligence Act was adopted by the EU Parliament on March 13, 2024, and is expected to **soon become law** when it is passed by the European Council.
- It will **take up to 24 months for all of it** to be enforced, but enforcement of certain aspects, such as the **newly banned practices**, could start to happen in as little as six months.

Why has the Act been brought?

- In recent times, the rapid progression of AI technology has prompted concerns about governments and regulatory bodies being adequately prepared to protect citizens' rights and well-being.
- **Industry leaders share apprehensions about AI's potential long-term disruptions.**

Why has the Act been brought?

- The application of AI in fields such as health and education poses significant implications.
- With the AI industry presenting a trillion-dollar business opportunity, governments seek a stake.
- **Unlike the internet, AI doesn't originate from government laboratories.**

Why has the Act been brought?

- The European Commission initially proposed AI regulation in the EU in April 2021.
- However, advancements like OpenAI's ChatGPT, introduced in 2022, **prompted Brussels to revisit the initial draft.**

Why has the Act been brought?

- After three days of intensive negotiations, the Union's three branches reached a compromise, **shaping the AI regulation for the foreseeable future, with a focus on ensuring human oversight over AI.**

What does the Act entail?

- The proposed AI Act aligns its definition of AI closely with the OECD's, **emphasizing machine-based systems that generate outputs influencing physical or virtual environments based on received input.**
- It adopts a "risk-based" approach, categorizing AI *systems into four groups*: unacceptable risk, high risk, general purpose and generative AI (GPAI), and limited risk.

What does the Act entail?

- **Unacceptable risk systems**, like social scoring and certain biometric identification, will be prohibited.
- **High-risk AI systems**, found in domains such as transport and education, must undergo a **fundamental rights impact assessment** and carry a CE mark before market release.

What does the Act entail?

- GPAI systems must adhere to transparency obligations, including complying with EU copyright law and releasing technical documents and training material summaries.
- Advanced GPAI systems face stricter regulations.
- Exceptions include allowing the use of unacceptable risk AI systems in cases of very serious crimes, subject to judicial approval and specific crime definitions.

What does the Act entail?

- The act doesn't apply to military or defense, research-only systems, and non-professional individual use.
- The governance structure involves enforcement by national agencies in each member state, with the **European AI Office overseeing administration and enforcement on a European level.**

What does the Act entail?

- The European AI Board will serve in an advisory role.
- To facilitate SME growth, the act introduces provisions for "Regulatory sandboxes" and "real-world testing."
- Citizens can seek redressal, filing complaints and receiving explanations for decisions impacted by high-risk AI systems.

What does the Act entail?

- Penalties for violations range from 7.5 million Euros to 35 million Euros or a percentage of turnover, with capped fines for smaller companies.

Pros

- The risk-based approach of the EU's AI Act is viewed positively for addressing the diverse challenges posed by AI.
- **It effectively balances the needs of law enforcement while safeguarding citizens' rights.**

Pros

- The inclusion of a fundamental rights impact **assessment prioritizes citizens' welfare.**
- Granting citizens the ability to seek redressal empowers them, **enhancing citizen participation.**
- The provisions supporting the growth of SMEs are commendable.

Cons

- Concerns have been raised about potential over-regulation, particularly with stringent provisions like high fines, which some fear may stifle innovation.
- **The establishment of a European AI Office and regulators in member states might face budgetary constraints.**

Cons

- The Act is not expected to come into full force before 2026, raising concerns about its *relevance given the rapid pace of AI development.*
- The regulation of **open-source AI software** is a significant concern due to its potential for misuse.

What's Next?

- The EU, through the AI Act, has initiated its journey toward the responsible use and development of AI.
- This positions the EU ahead of counterparts such as the **United States and the United Kingdom in the realm of AI regulation.**

What's Next?

- The legislation holds the potential to serve as a benchmark, **akin to the GDPR for data privacy and protection.**
- However, the EU must ensure that the final iteration of the Act **strikes a delicate balance between safeguarding citizens' rights, promoting innovation, and maintaining the necessary flexibility to stay aligned with the swift pace of AI advancement.**

2. Indian BrahMos missiles delivered to the Philippines: The Missile's significance

Context

- BrahMos Aerospace Private Limited (BAPL), a joint venture company of the DRDO, had signed a contract with the Philippines on January 28, 2022, for supply of **Shore Based Anti-Ship Missile System**.

How did BrahMos come about?

- In the early 1980s, the **Integrated Guided Missile Development Programme** was conceived and led by Dr A P J Abdul Kalam.
- Under this program started the development of a range of indigenous missiles including Prithvi, Agni, Trishul, Akash and Nag, **with a wide spectrum of capabilities and ranges.**

How did BrahMos come about?

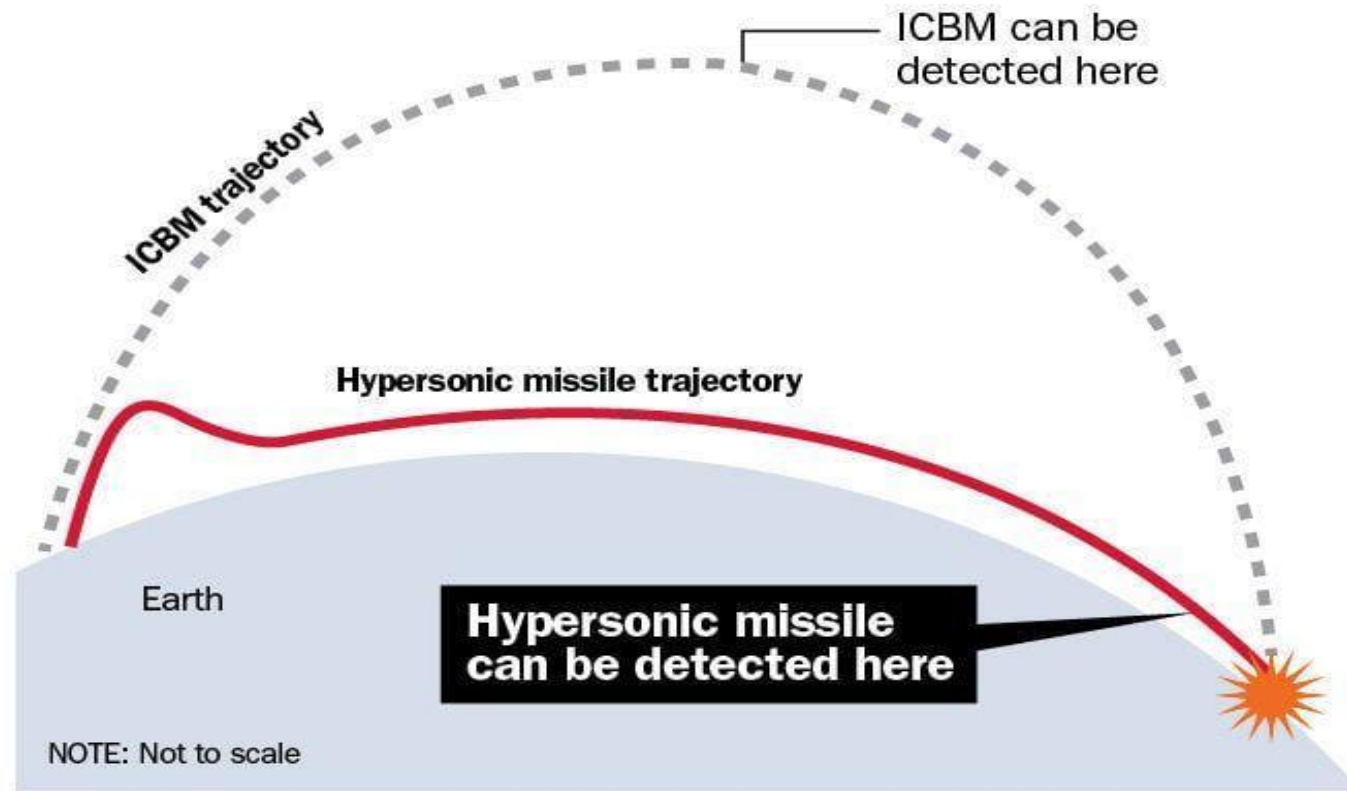
- In the early 1990s, India's strategic leadership felt the **need for cruise missiles** — guided missiles that **traverse the majority of their flight path** at almost constant speed and deliver large warheads over long distances with high precision.
- **The need was felt primarily following the use of cruise missiles in the 1991 Gulf War.**

What is a Ballistic missile?

- A ballistic missile is a type of missile which **uses projectile motion to deliver warheads on a target.**
- A ballistic trajectory means once the missile burns up the fuel that propels it, **it keeps moving** much like a **bullet does after it's been fired out of a gun.**
- **Once all the fuel is burned up, the missile's direction can't be altered.**

HYPERSONIC MISSILE VS. ICBM DETECTION

Because their flight takes them high above the Earth, the current generation of intercontinental ballistic missiles can be detected by ground-based sensors relatively early in their flight. Hypersonic missiles glide just above the atmosphere at 5 to 20 times the speed of sound and are much harder to detect from the ground because their flight path is hidden by the curvature of the Earth.



SOURCE: RAND analysis

THE WORLD-HERALD

What is a Ballistic Missile?

- The path is thus determined by the speed of its launch and the force of gravity trying to pull it back toward Earth's surface.

What is a Cruise Missile?

- Cruise missiles are **self-propelled** for the most part of their flight, flying in a **relatively straight line and at lower altitudes** due to rocket propellant.

How did BrahMos come about?

- An Inter-Governmental Agreement was signed with Russia in Moscow in 1998 by Dr Kalam, who headed the DRDO, and N V Mikhailov, Russia's then Deputy Defence Minister.
- This led to the formation of BrahMos Aerospace, a joint venture between DRDO and Russian Space company NPO Mashinostroyenia (NPOM).
- **The Indian side held 50.5% and the Russians 49.5%.**

How did BrahMos come about?

- It was named after two rivers in India and Russia respectively – the Brahmaputra and the Moskva.
- In 1999, work on development of missiles began in labs of DRDO and NPOM after BrahMos Aerospace received funds from the two governments.
- **The first successful test in 2001 was conducted from a specially designed land-based launcher.**

How did BrahMos come about?

- While it has been inducted into the Indian armed forces, it **surprisingly has not been inducted** into the Russian armed forces.
- The missile has few competitors in the international market, and the **recent Philippines deal** is expected to boost its exports.
- However, India needs to actively develop marketing and promotion networks to promote defence sales.

Strategic significance of BrahMos

- BrahMos is a two-stage missile with a solid propellant booster engine.
- Its first stage brings the missile to supersonic speed (meaning faster than sound) and then gets separated.
- The liquid ramjet or the second stage then takes the missile closer to three times the speed of sound in cruise phase.

Strategic significance of BrahMos

- The missile has a very low radar signature, making it stealthy, and can achieve a variety of trajectories.
- The 'fire and forget' type missile can achieve a cruising altitude of 15 km and a terminal altitude as low as 10 m to hit the target.

Strategic significance of BrahMos

- Cruise missiles such as BrahMos, called “standoff range weapons”, are **fired from a range far enough** to allow the attacker to evade defensive counter-fire.
- These are in the **arsenal of most major militaries** in the world.

Strategic significance of BrahMos

- The BrahMos has three times the speed, 2.5 times flight range and higher range compared to subsonic cruise missiles.
- With missiles made available for export, the platform is also seen as a key asset in defence diplomacy.

Strategic significance of BrahMos

- An extended range version of the BrahMos air-launched missile was tested from a frontline SU-30MKI aircraft in 2022.
- In the same year, an advanced sea-to-sea variant of BrahMos was tested from the INS Visakhapatnam.

Missile Specifications

- The BrahMos missile is a **two-stage supersonic cruise** missile with a solid propellant booster as its first stage and a liquid ramjet engine as its second stage.
- It has a flight range of 290 km and can carry a conventional warhead weighing between 200 kg to 300 kg.
- **The missile can be launched from land, sea, or air.**

Missile Specifications

- It has a cruising altitude of up to 15 km and a terminal altitude as low as 10 m.
- **The missile's speed and low-altitude capabilities make it difficult to intercept.**

MTCR Compliance

- The range of the BrahMos missile was deliberately capped at 290 km to comply with the Missile Technology Control Regime (MTCR).
- India became a member of the MTCR in 2016, allowing the successful testing of the BrahMos-ER version with an extended range of over 400 km in 2017.
- The extended-range version was ordered by the Indian Navy in 2022.

MTCR Compliance

- MTCR Regime was created to curb the spread of unmanned delivery systems for nuclear weapons, specifically systems which can carry a payload of 500 kilograms (1,100 lb) for 300 kilometres (190 mi).

Present and future of the BrahMos

- The missile system is unparalleled in its extreme accuracy and versatility.
- **Land-based BrahMos formations along the borders, BrahMos-equipped Sukhoi-30s at bases in Northern theatre and Southern peninsula, and BrahMos-capable ships and submarines deployed in sea together form a triad.**

Present and future of the BrahMos

- With evolving multi-dimensional warfare, the BrahMos is undergoing a number of upgrades and work is on to develop versions with **higher ranges, manoeuvrability and accuracy.**
- Versions currently being tested include **ranges up to 350 km, as compared to the original's 290 km.**
- Versions with even higher ranges, up to 800 km, and with hypersonic speed are said to be on cards.

Present and future of the BrahMos

- Efforts are also on to reduce the size and signature of existing versions and augment its capabilities further.
- **Versions deployed in all three-Armed forces are still being tested regularly, and so are versions currently under development.**

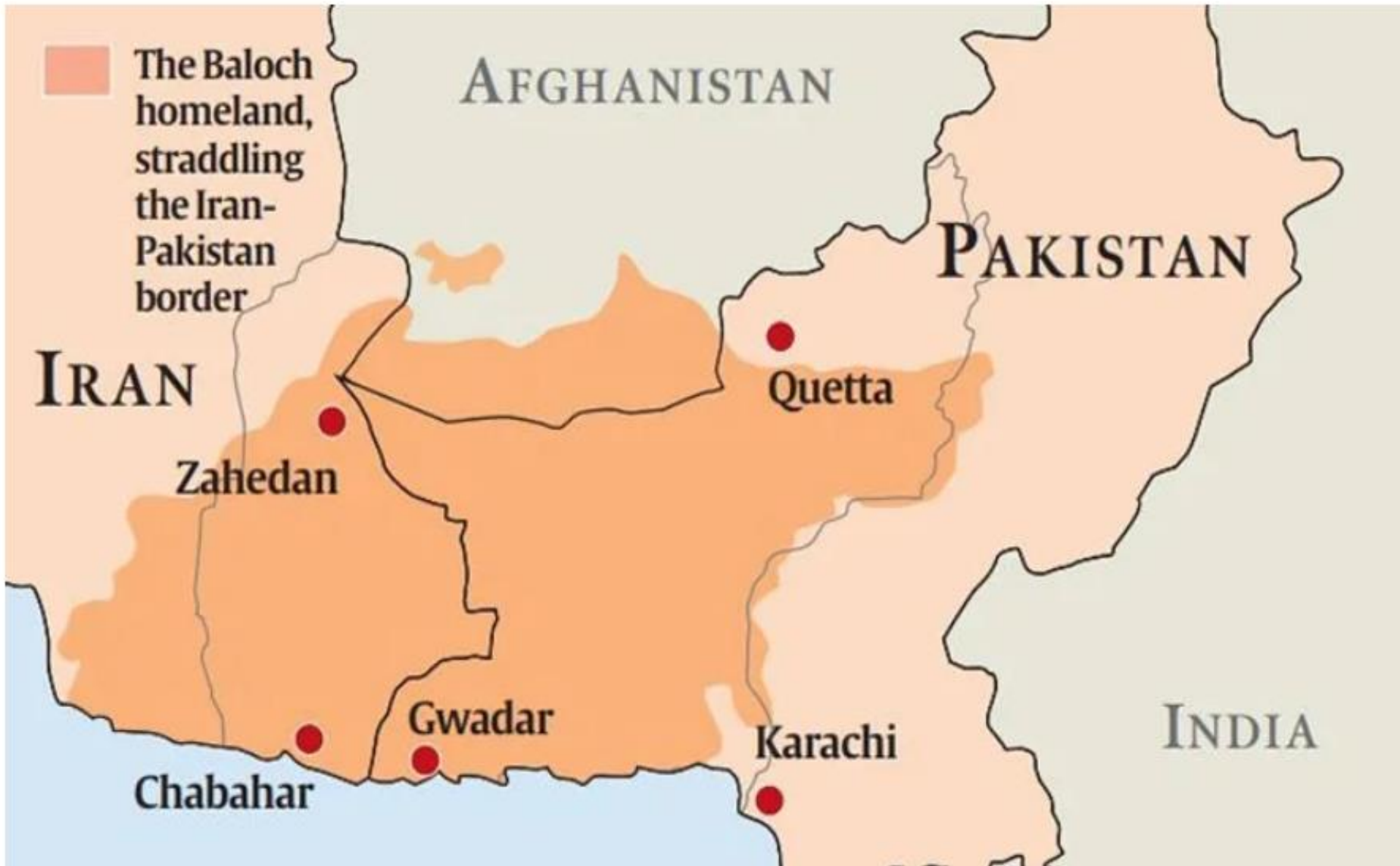
3. Why Balochistan remains Pakistan's 'problem province'

Context

- Pakistani security forces repulsed a militant attack on a complex outside its strategic **port of Gwadar in Balochistan province**.
- Eight militants and two soldiers were killed in the attack, with separatist group **Balochistan Liberation Army (BLA)** claiming responsibility.
- Balochistan, the largest Pakistani province, is sparsely populated and impoverished when compared to the rest of the country.

Context

- At the same time, its location as well as abundance of natural resources, especially oil, make it **strategically vital for Pakistan**.
- The province has been the site of a series of bloody insurgencies, brutal state repression, and an **enduring Baloch nationalist movement since 1948**.



Map showing Baloch areas in Pakistan and Iran.

Baluchistan's Struggle for Autonomy

- Balochistan, Pakistan's largest province by land area, has been embroiled in a protracted conflict marked by ethnic tensions, economic disparities, and political grievances.

Political Map Of Baluchistan



Baluchistan's Struggle for Autonomy

- **Forced Accession and Subsequent Conflict:**

- At the dawn of Pakistan's independence, Balochistan comprised several chiefdoms, with Kalat being the most prominent under the leadership of Ahmed Yar Khan.
- Initially hesitant to accede to Pakistan, Khan's aspirations for an independent Baloch state were thwarted by geopolitical exigencies, leading to Balochistan's forced accession in 1948.

Balochistan's Struggle for Autonomy

○ Subsequent protests and insurgencies, notably initiated by Prince Abdul Karim in 1948, have characterised the Baloch quest for autonomy, spanning decades of violent conflict.

Balochistan's Struggle for Autonomy

- **Human Rights Concerns and State Response:**
 - The Baloch insurgency has been met with severe state repression, with Pakistani forces accused of egregious human rights violations, including extrajudicial killings, enforced disappearances, and torture.

Balochistan's Struggle for Autonomy

- Reports from organisations like Amnesty International and Voice for Baloch Missing Persons highlight the widespread nature of these abuses, **with tens of thousands of casualties reported since the inception of the conflict.**
- Baloch nationalist groups, while championing autonomy, have also **faced accusations of human rights violations**, further complicating the conflict's humanitarian dimensions.

Balochistan's Struggle for Autonomy

- **Ethnic Dynamics and Economic Grievances:**
 - Ethnic disparities, rooted in Balochistan's distinct identity vis-à-vis Punjabis and Sindhis, have fueled the trajectory of the conflict, echoing the ethnic cleavages that precipitated **the disintegration of East Pakistan in 1971.**

Balochistan's Struggle for Autonomy

- Economic injustice, epitomised by the marginalisation of Balochistan's indigenous population in resource exploitation projects like the China-backed Gwadar Port, exacerbates existing grievances.
- The **preferential employment of non-Baloch technical experts** underscores the systematic exclusion of Baloch individuals from the economic benefits of their own land.

Balochistan's Struggle for Autonomy

- **External Influences and Geopolitical Dimensions:**
 - The Balochistan conflict is not confined within Pakistan's borders; external actors, including India and Iran, have been implicated in exacerbating tensions to advance their geopolitical interests.
 - **While Pakistan alleges foreign interference, particularly from India, in stoking unrest in Balochistan, such claims remain contested.**

Political Map of Iran



Conclusion

- Balochistan's struggle for autonomy encapsulates a multifaceted nexus of historical legacies, socio-economic disparities, and external influences.
- The enduring conflict underscores the imperative for a holistic approach addressing ethnic grievances, economic disparities, and human rights abuses to pave the way for sustainable peace and inclusive development in Pakistan's southwestern frontier.

Balochistan's Struggle for Autonomy

- Effective resolution necessitates meaningful dialogue, equitable resource distribution, and international cooperation to redress the deep-rooted grievances of the Baloch people and chart a path towards reconciliation and stability.

4. International Solar Alliance (ISA): Overview

About ISA:

- The International Solar Alliance (ISA) is a collaborative platform aimed at promoting the increased deployment of solar energy technologies.

International Solar Alliance (ISA): Overview

- It operates on an action-oriented and member-driven model with the fundamental objective of facilitating energy access, ensuring energy security, and driving energy transition across its member countries.
- Established as a joint effort by India and France, the ISA mobilizes efforts against climate change through the deployment of solar energy solutions.

International Solar Alliance (ISA): Vision & Mission

- The vision of the ISA is encapsulated in the motto "Let us together make the sun brighter," reflecting its commitment to harnessing solar energy for global progress.
- Its mission is to ensure that every home, regardless of its location, has access to light through solar energy solutions.

Membership & Observer Status

- The ISA is headquartered in India, with its interim secretariat located in **Gurugram**.
- Currently, **106 countries** have signed the ISA Framework Agreement, out of which **86** have ratified it.
- All member states of the United Nations are eligible to join the ISA.

International Solar Alliance (ISA): Overview

- Additionally, the United Nations General Assembly (UNGA) has granted Observer Status to the ISA, facilitating cooperation between the alliance and the UN for global energy growth and development.

Director General & Governance

- The ISA is headed by a Director General, responsible for leading the operations and functions of the ISA Secretariat.
- **The Director General serves a term of four years and is eligible for re-election.**

International Solar Alliance (ISA): Overview

- **The ISA Assembly serves as the apex decision-making body, comprising representatives from each member nation.**
- It deliberates on matters such as the selection of the Director General, ISA objectives, functioning, budget approval, and coordinated actions.

Objectives of ISA

- The ISA aims to develop and deploy cost-effective solar energy solutions to drive low-carbon growth trajectories, particularly focusing on Least Developed Countries (LDCs) and Small Island Developing States (SIDS).

Objectives of ISA

○ Its priority areas include Analytics & Advocacy, Capacity Building, Programmatic Support, and Readiness and enabling activities, designed to create a conducive environment for solar energy investments.

Important Projects of ISA

- **One Sun One World One Grid (OSOWOG):**
 - OSOWOG aims to facilitate global cooperation in renewable energy, creating a connected ecosystem of renewable energy resources, primarily solar energy.
 - It envisions a seamless sharing of economic benefits across geographical locations and is undertaken with support from the World Bank.

Important Projects of ISA

- **ISA Solar Technology and Application Resource Centre (ISTAR C):**
 - ISTAR C focuses on building a network of technical training, entrepreneurship, research, and innovation centers to promote knowledge dissemination and capacity-building in solar energy.
 - It also works on standardizing solar applications and enabling collaborative research and development among ISA member countries.

Important Projects of ISA

- **Indian Technical and Economic Cooperation (ITEC) Scheme:**
 - Under the ITEC Scheme, the Government of India provides training to master trainers in solar energy to ISA member countries.
 - The training, conducted at the National Institute of Solar Energy, Gurugram, spans 21 days and is fully funded by the Government of India.

5. Exercise MILAN

- India kicked off the multilateral Naval exercise 'Milan', in Visakhapatnam on the 21 February 2024.
- Entering its 12th edition, Defence Minister Rajnath Singh remarked, "Our historical experience informs us that Armed Forces also play a significant role in preserving peace. It is seen in deterrence and conflict prevention."

Exercise MILAN

- The 9-day mega naval exercise involved the participation of over 50 countries with around 14 new nations participating in this for the first time.
- The exercise comes at a time when geopolitical tensions remain high in the Red Sea as well as around the island of Taiwan.

Exercise MILAN

- First phase also known as the “Harbour phase” started on the 19th of February and finished on the 23rd of February.
- The second phase, known as the “sea phase “ starts right after that and will involve drills akin to anti-submarine and anti-surface warfare.

Exercise MILAN

- The indigenous aircraft carrier, INS Vikrant will also take part and the people will be able to see it on the coast of Vizag alongside the INS Vikramaditya.
- The Indian navy will showcase an armada of nearly 20 ships, and 50 aircraft which include the Mig 29K, Light Combat Aircraft Tejas and P-8I long-range maritime reconnaissance and anti-submarine warfare aircraft.

Exercise MILAN

- Nations such as the United States of America, Japan, South Korea, Australia, France, Bangladesh, Vietnam, Indonesia Malaysia, Russia, Seychelles, Maldives and Sri Lanka are some of the predominant nations participating in this exercise.
- Countries that are participating for the first time in the Milan Exercise are – **Canada, Eritrea, Fiji, Gabon, Germany, Iraq, Italy, Kuwait, Madagascar, Namibia, Papua New Guinea, Peru, Spain, Timor Leste and Yemen.**

Significance of Exercise MILAN

- Milan started way back in 1995 and the importance of the 'Look East' policy played a role in it.
- Countries like Singapore, Thailand, Sri Lanka, and Indonesia were the first participants in this event.
- **Milan is a biennial multinational naval exercise.**

Significance of Exercise MILAN

- To see the number growing from then till this point is a welcome change and enhances the importance of the Indian Navy as well as the Indian role in the Indo-Pacific.
- India is not just limiting itself to its Asian partners but also bringing those from West Asia, North America, Africa and Latin America.

Significance of Exercise MILAN

- It is important to note that until the 10th edition, the exercise was always held under the aegis of the Andaman and Nicobar Command.
- Since then, it's the second time Visakhapatnam has hosted the exercises and that too with a large number of navies involved with more armada at display.

Significance of Exercise MILAN

- In this, it's important to note that **both Russia and the US are participating** in a common event, highlighting the obvious belief they have in **India as a reliable partner** to both nations and in its way to manage even the most bitter rivals together.
- This signals **another touch on India's mature foreign policy at work which even today**, gets a warm reception from the global South and a mild irritated reception from the West.

Significance of Exercise MILAN

- 'MILAN' means 'a meeting of confluence and its motto – **'Camaraderie Cohesion Collaboration'** symbolizes the enduring spirit of international maritime cooperation.
- The exercise brings together like-minded nations that train and operate jointly towards establishing the regional synergy needed to achieve the shared objective of peace and prosperity, aligned with the Prime Minister's vision of **Security & Growth for All in the Region (SAGAR)**.

6. Agni V

Context

- India has successfully tested an Agni-5 missile equipped with MIRV technology, joining a small group of countries with this capability.
- Apart from inflicting crippling damage on the enemy, these missiles can dodge most defense systems.



Agni V

- The new Agni-5 missile capable of carrying multiple warheads and striking multiple targets.
- The new Agni missile is integrated with the MIRV technology.
- **The development of MIRV capability marks a significant upgrade for India's missile systems and expands its nuclear options.**

Multiple Independently Targetable Re-Entry Vehicle

- MIRV-equipped missiles can accommodate multiple warheads, each of which can be programmed to strike a separate target.
- They can all be made to hit the same location too, one after the other, thus ensuring complete annihilation of the target and greatly enhancing the missile's destructive potential.

MIRV

- While **simultaneous strikes** at multiple locations can have a debilitating impact on the enemy, the use of nuclear warheads can bring the opposition to its knees.
- It was developed in the 1960s and first deployed in the 1970s by the United States and the then Soviet Union.

Complicated Technology

- The warheads have to be miniaturized, be equipped with independent guidance and navigation controls, and released sequentially from the delivery system.
- Traditional missiles carry a single warhead, or weapon, that goes and hits the intended target.

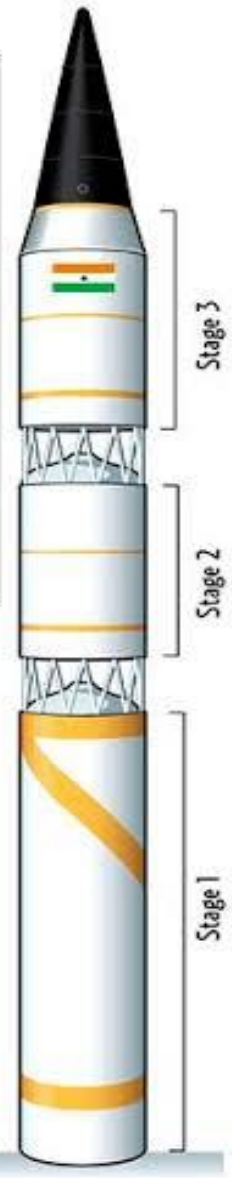
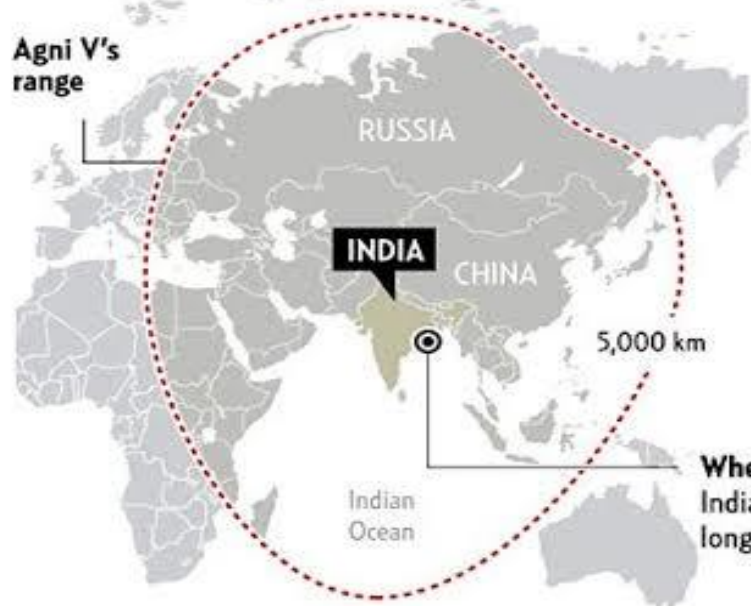
Advantages of Technology

- **Multiple Damage:** Inflicts multiple damages with a single strike.
- **Penetration of Missile Defence Systems:** Can penetrate missile defence systems due to multiple warheads with independent trajectories.

India's Agni V missile

The nuclear warhead-enabled Agni V is the fifth in the series of medium and long-range missiles made in India in the past fifteen years

- AGNI V**
- Operational range: 5,000 km
 - Payload: 1,360.78 kg
 - Height: 17 m
 - Future development possible for a submarine-launched variant



AGNI MISSILE SERIES

	Agni I	Agni II	Agni III
Range (km)	700	2,500	3,000
Payload (kg)	1,000	1,000	1,500
Height (m)	15	20	16.3

Sources: Indian Defence Research and Development Organisation, Globalsecurity.org, Visual Motion

Reuters/©Gulf News

Advantages of Technology

- **Complication of Tracking and Intercepting:** Multiple warheads make tracking and intercepting extremely complicated.
- **Use of Decoy Warheads:** Can carry decoy warheads to confuse defence systems, increasing the likelihood of penetration.
- **Strategic Deterrence:** Provides the capability for a disproportionate response strike, serving as a deterrence to enemies.

Never Used in Conflict

- An MIRV-equipped missile has never been used so far in any conflict situation.
- Arms control advocates argue that MIRV technology incentivises the urge to strike first, thus increasing the risk from nuclear weapons.

Other Nations & MIRV

- Over the years, France, the United Kingdom, and eventually China have developed this technology.
- Pakistan too has claimed to have tested an **MIRV-equipped missile** called Ababeel, first in 2017 and then in 2023.

Warhead Carrying Capacity

- The number of warheads that a missile can carry depends on its design, weight, size, range and other parameters.
- The missile tested by India can carry three to four warheads according to DRDO.
- **India has other systems that can carry as many as 15 warheads, or even more.**

Agni missile

- **What are Agni-5 missiles?**
 - Agni is a long-range missile developed indigenously by the Defence Research and Development Organisation, DRDO.

Agni missile

- The family of Agni missiles has been in the arsenal of the Indian armed forces since the early 1990s.
- This latest variant of the missile is equipped with what is known as MIRV (Multiple Independently Targetable Reentry Vehicle) technology, first developed at least five decades ago but in possession of only a handful of countries.

Agni missile

- **Agni Missile Upgrade:**

- The incorporation of Multiple Independently Targetable Reentry Vehicle (MIRV) technology is a **significant advancement** for India's Agni missile series, developed domestically by the DRDO.
- **Agni missiles serve as the primary land-based delivery systems for India's nuclear arsenal.**

Agni missile

- **Generational Evolution:**

- Originally developed in the 1990s, the first-generation Agni missiles were deployed in the mid-2000s.
- Ranging from Agni-1 to Agni-IV, these missiles cover distances between 700 to 3,500 km and carry single payloads ranging from 12 to 40 kilotons.

Agni missile

- The latest iteration, Agni-5, equipped with MIRV technology, **boasts a range exceeding 5,000 km**, potentially entering the intercontinental range of 5,500 km and beyond.

Technological Advancements

- Agni-5 has undergone multiple tests since 2012, showcasing enhanced capabilities, including recent night-time operational assessments conducted in December 2022.
- Concurrently, **DRDO is developing Agni-P missiles,** modernized versions of the short-range Agni-1 and Agni-2 missiles, with expectations of MIRV integration, based on tests conducted in 2021.

Strategic Imperatives

- India's pursuit of MIRV technology was motivated by China's advancements in this field over the past decade, coupled with Pakistan's claims of testing similar capabilities.
- Integrating MIRV into Agni missiles became imperative in maintaining strategic parity.

Future Prospects

- The forthcoming Agni-6 missile, currently in development, is anticipated to also feature MIRV technology, ensuring India's continued strategic capabilities in missile technology.

What is a Ballistic Missile?

- A ballistic missile is a type of missile which uses **projectile motion to deliver warheads** on a target.
- A ballistic trajectory means once the missile burns up the fuel that propels it, **it keeps moving much like a bullet does after it's been fired out of a gun.**
- **Once all the fuel is burned up, the missile's direction can't be altered.**

What is a ballistic missile?

- The path is thus determined by the speed of its launch and the force of gravity trying to pull it back toward Earth's surface.

What is a cruise missile?

- Cruise missiles are self-propelled for the most part of their flight, flying in a relatively straight line and at lower altitudes due to rocket propellant.

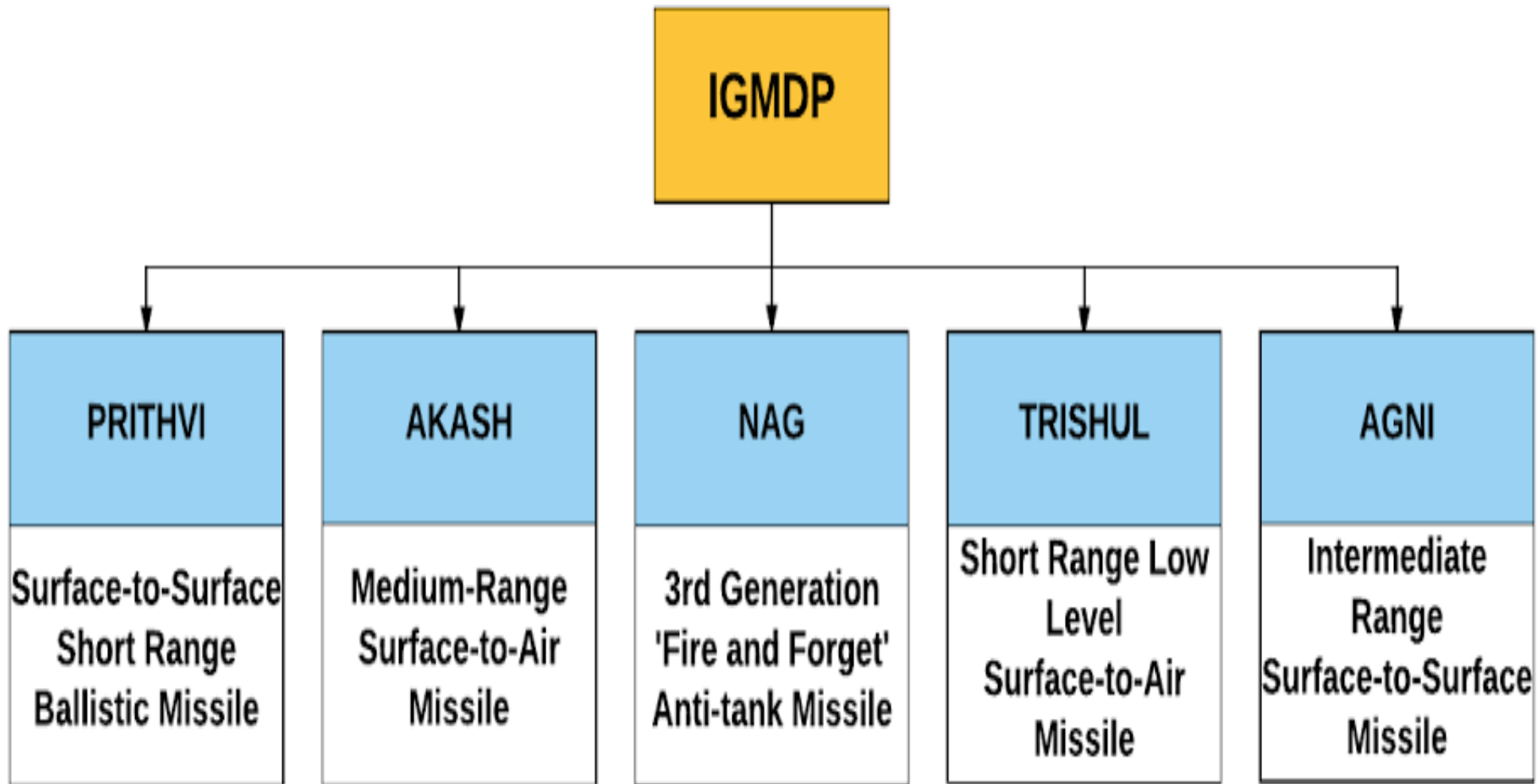
Table 1 – Key characteristics of ballistic and cruise missiles

Characteristics	Ballistic missiles	Cruise missiles
Range	From low to very high <i>Up to 15 000 km</i>	Mostly around 1 000 km <i>Up to 4 000 km</i>
Altitude	High <i>Easily detectable</i>	Low <i>Hard to detect</i>
Precision	Low – around a few hundred metres <i>Fit for large targets</i>	High – a few metres <i>Fit for small and mobile targets</i>
Speed	Up to 25 000 km/h at impact <i>Very hard to intercept</i>	Around 1 000 km/h <i>Possibility to intercept</i>

Data source: EPRS.

Agni Missiles

- The Agni series of ballistic missiles is being developed under the **Integrated Guided Missile Development Programme** of the Defence Research and Development Organisation of India.



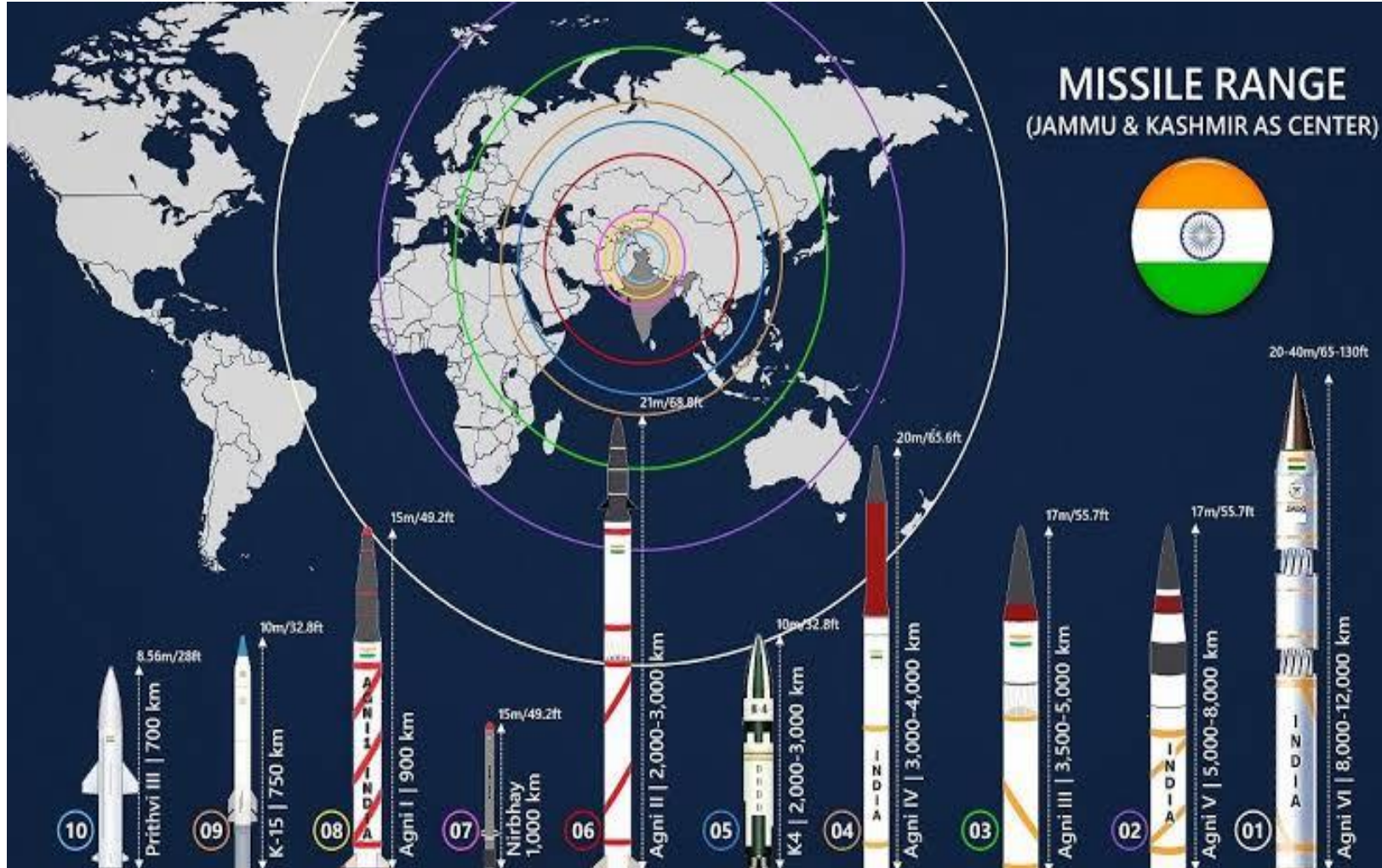
Agni P Missile

- The 2,000km range Agni Prime, the next-generation ballistic nuclear missile that covers all **critical cities in Pakistan**, has cleared all tests and is set to be inducted into India's arsenal.
- The Agni P, **initially named Agni-1P** and *weighing 50 per cent less than Agni 3*

Agni P Missile

- The missile can be launched from rail or road and can be **transported to various parts** of the country easily.
- Agni Prime can be manoeuvred at the point of entry into the earth's atmosphere, a feature that is **usually not available in a ballistic missile**.
- This makes the Agni Prime more difficult to intercept.

Range of the Agni class



India vis a vis neighbors

- Agni V made India the eighth nation in the world to have intercontinental ballistic missile (ICBM) capabilities.
- It can target any target in Asia and half of Europe with its range of 5,000 km and can carry a payload of 1.5 tonnes of nukes.
- India lags behind both its neighbors China and Pakistan in the numbers of nuclear warheads.