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STARLINK: THE NEGATIVE IMPLICATIONS OF THE NEW DOMINANT FORCE IN LOW-EARTH ORBIT

SOURCE: [TH](#)

GS 3

WHY IN NEWS: In a recent development, SpaceX, the foremost private space technology company globally, has introduced the Starlink Network into the Lower Earth Orbit (LEO). This initiative is geared towards offering affordable and dependable internet services via space to people around the world.

ABOUT STARLINK PROJECT :

- **Satellite Constellation:** Starlink involves deploying a massive constellation of small satellites in low-earth orbit to create a global broadband network.
- **Internet Coverage:** The goal of Starlink is to provide high-speed, low-latency internet coverage to even remote and rural areas around the world, helping bridge the digital divide.
- **Global Reach:** The constellation aims to ensure global coverage, making internet access available in regions where traditional infrastructure is difficult to establish.
- **Low Earth Orbit (LEO):** Satellites are positioned in low-earth orbit, typically around 550 km to 1,200 km above the Earth's surface, which helps reduce signal latency and allows for faster data transmission.
- **Low Latency:** The LEO placement contributes to low latency, which is essential for real-time applications like online gaming, video conferencing, and remote work.

PRELIMS SPECIFIC

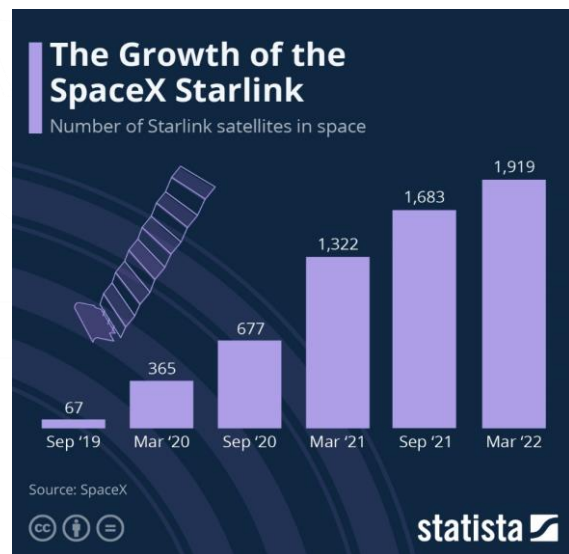
WHAT IS SATELLITE BROADBAND

- The technology transmits internet signals from a satellite positioned in Earth's orbit.
- This communication mainly occurs with satellites either stationed in geostationary orbit or orbiting closer to the Earth's surface, known as Lower Earth Orbit (LEO).
- The objective is to offer affordable internet services to remote areas that are otherwise difficult to access.
- Geostationary orbit and Lower Earth Orbit are viewed as the opposite ends of satellite communication options.

- **Satellite Design:** Starlink satellites are relatively small and lightweight, equipped with multiple high-throughput antennas and advanced propulsion systems for precise orbital adjustments.
- **Commercial Potential:** Starlink aims to generate revenue by offering internet services to consumers, businesses, and potentially even aircraft and ships in remote locations.

ADVERSE IMPACTS OF STARLINK PROJECTS

- **Light Pollution:** The large number of satellites in the Starlink constellation can contribute to increased light pollution in the night sky, affecting astronomical observations and the beauty of celestial views.
- **Space Debris:** The deployment of thousands of satellites raises concerns about adding to the growing problem of space debris, increasing the risk of collisions and potential damage to other satellites.
- **Radio Frequency Interference:** The high number of satellites transmitting signals in the same frequency bands could lead to interference with other satellite systems and radio astronomy observations.
- **Limited Rural Access:** While Starlink aims to provide internet to remote areas, the cost of user terminals and subscriptions might still be prohibitive for some underserved communities.
- **Environmental Concerns:** The process of manufacturing, launching, and operating satellites has environmental implications, including carbon emissions and resource usage.
- **Reliance on Space-Based Infrastructure:** The project's success relies on an intricate network of satellites, which could lead to interruptions in service if a significant number of satellites malfunction or fail.



CONCLUSION

The project's success relies on its ability to address these concerns, collaborate with the broader space community, and adhere to evolving regulatory standards. Balancing the positive impact of global connectivity with the need to minimize negative effects on astronomy, the environment, and space sustainability will be crucial for the long-term viability and acceptance of the Starlink project.

SUPERCONDUCTING HYPE: ON SOUTH KOREA'S LK-99

GS 3

SOURCE: [TH](#)

WHY IN NEWS: A team of scientists from South Korea has recently announced that they have found a substance called LK-99. As per their findings, LK-99 demonstrates superconducting properties under normal room temperature and pressure conditions.

Superconductors are materials that exhibit zero electrical resistance and expel magnetic fields when cooled below a critical temperature. This phenomenon allows for the efficient transmission of electric current without any energy loss.

EG: Mercury-based superconductors, like $\text{HgBa}_2\text{Ca}_2\text{Cu}_3\text{O}_8$, function at extremely low temperatures, near -140°C (-220°F).

APPLICATIONS OF SUPERCONDUCTORS

- **Electric Power Transmission:**
Superconductors can carry electric current with minimal loss, enabling more efficient long-distance power transmission.
- **Magnetic Levitation (Maglev) Trains:**
Superconducting magnets create strong magnetic fields, allowing trains to levitate above tracks and achieve high speeds with reduced friction.
- **Medical Imaging:**
Superconducting magnets are used in MRI machines to produce high-resolution images of the human body.
- **Particle Accelerators:** Superconducting magnets are crucial components in particle accelerators like the Large Hadron Collider (LHC) to steer and control particle beams.
- **Power Storage:** Superconducting materials can store energy in their magnetic fields, offering potential for high-capacity, rapid-response energy storage.
- **Wireless Power Transfer:** Superconducting coils can efficiently transfer power wirelessly, enabling applications like wireless charging.

NATIONAL SUPERCONDUCTIVITY MISSION

- In 2017, the Indian government introduced the **National Superconductivity Mission (NSM)** with the intention of fostering research and advancement in the realm of superconductivity.
- This initiative endeavors to cultivate domestic technology for superconductors and their applications across diverse sectors such as healthcare, energy, and transportation.
- The execution of the NSM is a joint effort involving the **Department of Science and Technology (DST)**, the **Department of Atomic Energy (DAE)**, and the **Council of Scientific and Industrial Research (CSIR)**.
- This mission is allotted a financial allocation of INR 750 crores, equivalent to roughly USD 105 million, spanning a five-year period.

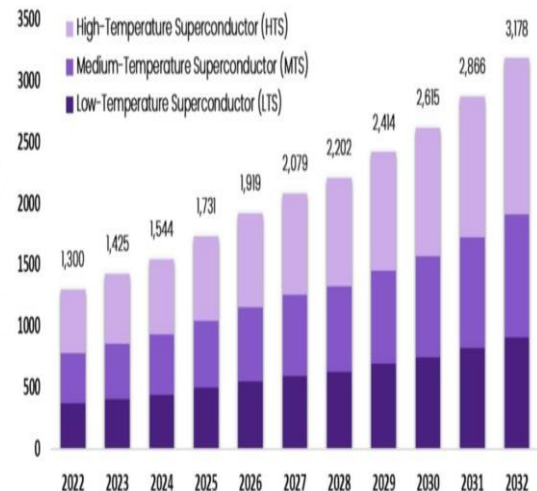
- **Sensors:** Superconducting sensors are used in various fields including astronomy, geophysics, and materials testing due to their high sensitivity.

ABOUT LK 99

- The two new papers uploaded on the internet, by researchers from South Korea, state the creation of a material known as LK-99.
- As per them, this material can conduct superconductivity at room temperatures.
- According to South Korean researchers, LK-99, the new superconductor, can be synthesised through a baking process that involves combining the minerals **lanarkite (Pb₂SO₄,...)** and **copper phosphide**.
- The resulting material exhibits two essential characteristics of superconductivity even at normal air pressure and temperatures as high as **127 degrees Celsius**.
- The researchers have put forward a plausible theory explaining how LK-99 could achieve room-temperature superconductivity.
- They have not yet provided definitive experimental evidence to support their claims.

Global Superconducting Wire Market

Size, by type, 2022-2032 (USD Million)



CHALLENGES ASSOCIATED WITH SUPERCONDUCTIVITY

- **Expensive Production:** The manufacturing of superconducting materials is costly, involving specialized processes that contribute to their high expenses.
- **Low Threshold Temperatures:** Superconducting materials typically demand extremely cold temperatures to showcase their characteristics. This requirement poses challenges in achieving and maintaining such low temperatures.
- **Vulnerability to Magnetic Fields:** Superconducting materials are responsive to magnetic fields, which can interfere with their attributes.
- **Susceptibility to Mechanical Damage:** Certain superconducting materials are susceptible to mechanical fragility, making their manipulation intricate and limiting their utilization in scenarios necessitating mechanical resilience.

CONCLUSION

Through continuous exploration and progress in research and innovation, it is plausible that numerous hindrances can be surmounted, leading to the integration of superconductivity as a pivotal element in contemporary technology. Given its capacity to enhance energy efficiency, expedite computing processes, revolutionize medical imaging, facilitate rapid transportation, and bolster sustainable energy initiatives, the realm of superconductivity stands as an immensely intriguing and auspicious field.

GS 2

SOURCE : [TH](#)

WHY IN NEWS: The Jan Vishwas Act of 2022, which has been recently passed by the Parliament, is a topic of controversy. The government presents it as a significant legal milestone with the objective of enhancing the "ease of doing business" in India. The Act achieves this by either removing criminal charges or making certain offenses "compoundable" under 42 different legislations.

The Jan Vishwas Bill is set to introduce modifications to the Drugs and Cosmetics Act of 1940 in two distinct ways

FIRST AMENDMENT:

- The Jan Vishwas Bill will eliminate the provision of imprisonment outlined in section 30 (2) of the existing legislation for companies that repeatedly utilize government analysis to endorse their products.
- Currently, such companies can be sentenced to a maximum of two years in prison and a fine not lower than ten thousand rupees for repeated offenses. This will be modified to involve solely a fine, albeit not below five lakh rupees.

SECOND AMENDMENT:

- It will revise section 32B (1) of the current statute to enable the "compounding" of violations as outlined in section 27 (d).
- companies breaching the provisions of 27 (d) will still be subject to imprisonment ranging from one to two years and a fine exceeding RS20,000.

PRELIMS SPECIFIC

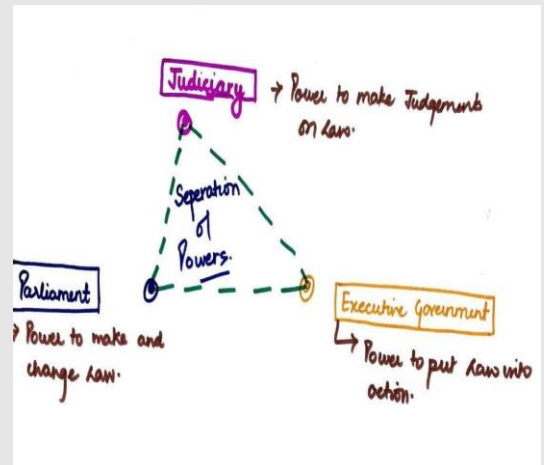
Constitutional provisions depicting separation of power:-

Article 50 - State shall take steps to separate the judiciary from the executive .

Articles 74 and 163 - : It restricts the courts from inquiring into the advice tendered by the Council of Ministers to the President and the Governor.

Article 122 and 212 :- Validity of proceedings in Parliament and the Legislatures cannot be called into question in any Court.

Article 361 :- states that the President or the Governor is immune from legal scrutiny by any court regarding the exercise

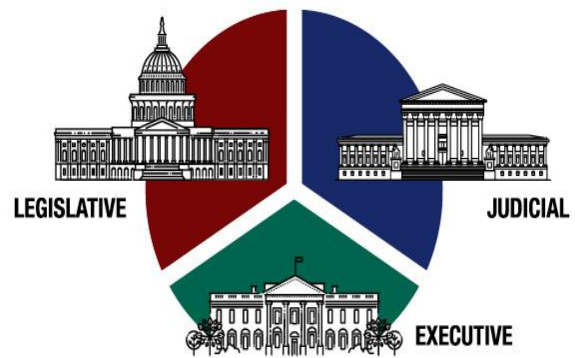


- However, a new option will be introduced wherein the company could opt to settle the matter by paying the fine, avoiding the need for a criminal legal process in court.

OBJECTIONS TO THE ACT:

- The rules have mostly changed jail punishment to fines, and this change moves the power to decide these money penalties from the courts to the government's administrative system.
- **EG:** The Jan Vishwas Act changes the Environmental (Protection) Act, 1986, and the Air (Prevention and Control of Pollution) Act, 1981. Instead of sending people to jail for some offenses, it introduces fines of up to ₹15 lakh. These fines can be decided by specific government officials (Joint Secretaries) assigned for this purpose.
- As per changes made to the Indian Forest Act, 1927, forest officials now possess the authority not only to investigate and find out the extent of harm caused to the forest by anyone but also to instruct the wrongdoer to provide compensation for the previously unlimited "damage" they caused to the forest.
- Despite India Inc. frequently expressing concerns about "tax terrorism," there is a curious absence of resistance towards granting the administrative system the authority to simultaneously act as both the accuser and the decision-maker in imposing fines and directing the settlement of compensation.
- The fundamental query revolves around whether entrusting the bureaucracy, as opposed to the courts, with the authority not only to resolve factual disagreements but also to impose penalties and mandate compensation, contradicts the constitutional principle of the Separation of powers.

Separation of Powers



THE LEGISLATIVE BRANCH enacts the laws of the country and raises and distributes the money necessary to operate the government, known as "The Power of the Purse."

THE JUDICIAL BRANCH interprets the U.S. Constitution and bylaws and rules on disputes brought before it by citizens, states, or other branches of government.

THE EXECUTIVE BRANCH implements and administers the laws and public policies enacted and funded by the Legislative Branch.

HOW BUREAUCRACY IS ENCROACHING UPON JUDICIAL ACTIVITIES

- Various Ministries initiated the establishment of judicial tribunals to assume control over diverse judicial responsibilities previously carried out by the courts.

- The majority of these tribunals were established in a way that allowed bureaucrats to potentially join the tribunals as "technical members."
- The federal government initiated the establishment of a fresh category of legal overseers like the Securities and Exchange Board of India, and the Competition Commission of India (CCI), empowered to levy substantial penalties on private enterprises. Nearly all of these regulatory bodies wound up being led by senior bureaucrats.
- The officials responsible for making judgments were consistently bureaucrats who were granted authority to either validate "attachment orders" concerning properties or impose fines on businesses.
- The Jan Vishwas Act continues with this particular approach of establishing "adjudicatory officers" within the administrative system to enforce penalties.
- The legality of bodies like the National Tax Tribunal and certain regulators like the CCI has been contested in court due to apprehensions regarding the executive branch infringing upon judicial authority.

CONCLUSION

As the bureaucracy acquires more authority and continues to encroach upon judicial functions, it could potentially lead to a more significant problem. This situation indicates a regression in the Republic of India's adherence to the principle of the separation of powers, which undermines the core essence of our Constitution.

VALUE ADDITION

JUDICIAL PRONOUNCEMENT: -

- **Kesavananda Bharati case(1973)** :- Separation of power is part of Basic structure doctrine.
- **Indira Gandhi vs Raj Narain(1975)**:- resolution of a dispute is a judicial function in which parliament cannot exercise power.
- **Asif Hameed vs State of J & K (1987)** :- Legislative, executive and judiciary cannot breach their boundaries.

2 ARC Recommendation: -

- **Office of profit:** - Define office of profit to ensure separation of powers.

Legislative independence: - lok sabha must keep their roles separate as minister and constituency members