GS Paper II – International Relations **Date: 28.04.26**

India, New Zealand sign 'historic' free trade deal

Deal to be implemented after New Zealand Parliament ratification later this year; Prime Minister calls the agreement a milestone, says it reflects 'convergence of values, trust, and shared ambition'

T.C.A. Sharad Raghavan
NEW DELHI

India and New Zealand on Monday signed a Free Trade Agreement (FTA) that Prime Ministers of both the countries hailed as a "historic" step towards deepening trade, investment, and people-to-people ties.

The FTA, signed by Commerce Minister Piyush Goyal and his New Zealand counterpart, Todd McClay, in New Delhi, will see New Zealand removing tariffs on all goods imported from India, while India will remove or reduce tariffs on 95% of current imports from New Zealand.

"Today marks a historic milestone in India's journey towards deeper global engagement and shared prosperity," a statement read out by Mr. Goyal quoted Prime Minister Narendra Modi as saying. "The signing of the India-New Zealand Free Trade Agreement reflects our strengthening economic partnership and a convergence of values, trust and shared ambition between two vibrant democracies."

This FTA, discussions for which were announced in March 2025 and concluded in December 2025, is one of the fastest India has negotiated.

The deal still needs to be ratified by New Zealand's Parliament, which Mr. McClay said would happen soon while adding that it would come into force within this year.

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Deal dynamics

The graphic lists select products on which India will be reducing or eliminating tariffs, as well as items excluded from the deal. New Zealand has removed tariffs on all items

Immediate elimination
- Wood | Wool
- Leather-raw hides

Phased elimination
- Petroleum oil
- Vegetable oils
- Select electrical machinery

Tariff reductions
- Wine and pharma
- Polymers, aluminium, iron and steel articles

Products excluded by India
- Dairy products (milk, cream, whey, yoghurt, cheese etc.)
- Animal products (other than sheep meat)
- Agricultural products (onions, chana, peas, corn, almonds etc.)
- Sugar | Artificial honey
- Copper and articles thereof (cathodes, cartridges, rods)
- Aluminium and articles thereof (ingots, billets etc.)

Sealing the deal: Union Minister of Commerce and Industry, Piyush Goyal, with New Zealand's Minister for Trade and Investment, Todd McClay, during the signing ceremony of the FTA in New Delhi on Monday. SUSHIL KUMAR VERMA

GS Paper II – Polity

Electoral roll purges raise constitutional questions

P.D.T. Achary

Former Secretary General, Lok Sabha

Voter deletions under the Special Intensive Revision of electoral rolls raise concerns over constitutional and procedural validity

The Election Commission of India (ECI) has invented the term "logical discrepancy" to delete voters from the voters' list in the recent elections (the States of Assam, Kerala, Tamil Nadu and West Bengal, and the Union Territory of Puducherry). It is alleged that lakhs of voters have been removed from the voter list in States where elections have been held recently. Even the Supreme Court of India's innovative idea of tribunals could not get these voters back onto the list, mainly because of the near-total mess created by the ECI's Special Intensive Revision (SIR) of electoral rolls exercise.

It has been pointed out by many commentators – including this writer in this daily – that the SIR, as designed by the ECI, is deeply flawed and, if continued, will result in the elimination of a very large number of Indian citizens from the electoral roll. Media reports indicate an alarming situation, particularly in West Bengal, where lakhs of genuine citizens have had their names removed from the electoral roll and placed under the category of "logical discrepancies". The fact is that many of them were unable to vote in the election/first phase of the election.

Citizenship as basic requirement

The issue of the elimination of people from the voter list revolves around the question of citizenship. Article 326 enjoins that every person who is a citizen of India and who is not less than 18 years of age and who is not disqualified under the Constitution or law shall be entitled to be registered "as a voter at any election". Thus, citizenship is the basic requirement for anyone to be registered as a voter.

The citizenship law is administered by the Union Home Ministry. Therefore, it is the duty of the Ministry to announce the list of documents required to prove the citizenship of Indians. However, as far as is known, the Ministry has not issued any such list.

Instead, the ECI announced a list of documents at the time of initiating the SIR in Bihar. Since many documents that citizens normally use for various purposes, such as Aadhaar card, ration card, and even the photo voter identity card issued by the ECI itself, were not accepted by the ECI as proof of citizenship, people began running helter-skelter in search of the documents listed by the ECI. Many of such documents were hard to find, especially for rural people who are not in the habit of preserving such documents. Thus, as many as 91 lakh voters were removed from the voter list in West Bengal because they could not produce the documents that the ECI required to prove their citizenship

Duty of the Home Ministry

A question of great constitutional significance arises here. Does the ECI have the power under Article 324 to determine what documents the citizens should produce to prove their citizenship? The simple answer is that such power is vested in the Union Home Ministry, and it is the constitutional duty of the Home Ministry to announce publicly the documents required for this purpose. The ECI can only verify those documents while enrolling citizens in the voters' list. Here, the ECI is acting beyond its jurisdiction. Article 324 does not empower the ECI to usurp the power of the Home Ministry. But it is surprising that the Supreme Court did not address this question when the issue of documents came before it. It was expected that the Court would direct the Union government to announce the list of documents and submit an affidavit in this regard. Instead, the Court merely requested the ECI to consider whether the Aadhaar card could also be counted as a relevant document.

The SIR has been conducted in the election-bound States, deviating from the law. Section 21 in The Representation Of The People Act, 1950 says that the electoral roll shall be revised before each general election and before a bye-election and also in any year as directed by the ECI. Apart from these the ECI can also undertake a special revision of the roll of a constituency or part of it for reasons to be recorded. Rule 25 of the Registration of Electors Rules, 1960 explains that the revision can be done summarily or intensively, which makes it clear that pre-election revision is summary in nature and the revision done in any year (when there is no election coming up) is intensive.

A combined reading of Section 21(2) of The Representation Of The People Act, 1950, and Rule 25 of the Registration of Electors Rules makes it clear that only a summary revision of the rules can be done before the general election or any bye-election.

The intensive revision can be done at any other time when elections are not due, the reason being that such a revision is very comprehensive and the voters' list needs to be prepared afresh. It is a very time-consuming exercise and cannot be done in such a hasty manner. The SIR conducted by the ECI a couple of months before the Bihar election, and, thereafter, in Kerala, Tamil Nadu and West Bengal is thus a clear deviation from the law and past practice.

In West Bengal, where the SIR exercise was absolutely chaotic, over 91 lakh voters have been removed from the voter list, many of whom have been placed in the category of "logical discrepancy". This categorisation of citizens is unknown to the election law. The Registration of Electors Rules, 1960 lays out a detailed scheme for the preparation of the electoral roll. Besides, the ECI has issued detailed instructions, one of which is that the booth-level officers (BLOs) should distribute enumeration forms to all existing electors through house-to-house visits.

Rule 8 clearly states that the occupants of the dwelling houses shall furnish the information called for to the best of their ability. This should mean that the ECI will have to accept the information that the occupants of the house have collected to the best of their ability. It makes no sense for the ECI to insist on obtaining information that, in the normal course, is not possible to procure, particularly for unlettered rural people in remote parts of the country. The fact that 64 lakh voters in Bihar and 91 lakh in West Bengal were removed from the voters' list amply demonstrates the deliberate non-adherence to this and other rules by the ECI.

An instance of violations

The object of this hastily conducted SIR seems to be to remove millions of voters from the voters' list. Media reports suggest that much of these deletions have been done without giving those affected a hearing, which is a blatant denial of natural justice as well as a violation of statutory provisions. Free and fair elections cannot be ensured by deviating from or violating the statute. The justice system in the country cannot permanently turn a blind eye to it.

GS Paper II – Polity

THE HINDU

Gang of seven

Large-scale defections have rendered the Tenth Schedule impotent

On April 24, seven of the Aam Aadmi Party (AAP)'s 10 Rajya Sabha members announced their merger with the Bharatiya Janata Party (BJP). The Rajya Sabha Chairman has accepted their claim of merger, raising the BJP's strength in the Upper House to 113 and the combined strength of the National Democratic Alliance above the halfway mark for the first time. The episode highlights the nature of AAP, the crass opportunism of the turncoats, the machinations of the BJP, and the institutionalised defanging of the anti-defection law. Of the seven, Raghav Chadha, Sandeep Pathak and Swati Maliwal were part of AAP in an organic manner, to the limited extent that it had an identity beyond the whims of its founder, Arvind Kejriwal. For the other four, their exit is as opportunistic as their entries into AAP were. Mr. Kejriwal used to taunt the Congress for losing its legislators to the BJP in several States, as symptomatic of the erosion of its ethical responsibility. But a relentless campaign of anarchy in pursuit of power exposed the true character of AAP as a far cry from its grand claims. The disintegration of its Rajya Sabha contingent is the culmination of the cynicism and opportunism on which AAP thrived, imposing a heavy cost on the democratic institutions of India. It reaped what it sowed.

That is no reason to ignore the brazen misinterpretation – invoked by the gang of seven and accepted by the Chairman of the Rajya Sabha – of the Tenth Schedule of the Constitution, which bars the defection of elected representatives from their original party. The merger exception in the Schedule is clear that a party can merge with another, subject to the concurrence of two-thirds of its legislators. In 2023, the Supreme Court of India elaborated that the legislature party cannot dictate the course of the political party, and the two cannot be conflated. Two-thirds of the members of the legislature party of the original party must accept a merger for it to be valid under the anti-defection law. To turn this around and argue that two-thirds of a party's legislative members can cross over to another party without attracting disqualification is a stretch, and is being challenged in the Court by AAP. The Court's past interventions on similar developments are less than reassuring, sadly. Elected governments have been unseated on the back of large-scale defections, rendering the Tenth Schedule impotent in the recent past. That the Court could not set any deterrence to this open betrayal of popular mandates is borne out by the fact that such acts are being repeated with impunity.

GS Paper II – Governance

A tightening of the fist in India's digital public square

Vikram Raj

Journalist associated with the Internet Freedom Foundation

The draft amendments to India's Information Technology Rules trigger fears of digital overreach and a departure from existing judicial rulings

Imagine this. You leave a sharp, satirical comment on social media or under a news article about rising fuel prices, and it gets a few likes. A few hours later, the comment disappears. The platform does not explain. Your account remains, but you notice that posts on similar topics no longer appear publicly. You have not been charged with any offence. No court has issued an order. Yet something has quietly shifted.

This is not a far-fetched scenario. It is a plausible outcome under the draft amendments to India's Information Technology Rules released by the Ministry of Electronics and Information Technology (MeitY) on March 30, 2026. Presented as technical clarifications, the changes mark a deeper transformation in how speech is governed online and who gets to decide its limits.

Core area of concern

At the centre of concern is a proposed expansion of executive power that risks bypassing Parliament and the courts. One provision, Rule 3(4), would require platforms to comply with a wide array of government-issued instruments, including advisories, directions and standard operating procedures, as a condition for retaining "safe harbour" protection under Section 79 of the IT Act. In plain terms, platforms would be legally safer if they follow government instructions, even when those instructions do not arise from formal law.

This sits uneasily with the Supreme Court of India's landmark ruling in *Shreya Singhal vs Union of India* (2015), which held that platforms are only required to act on unlawful content when they receive a court order or a government notification grounded in law. By allowing informal directives to trigger compliance obligations, the draft rules appear to dilute that constitutional safeguard.

The likely result is not targeted moderation but broad over-censorship. Faced with uncertain and potentially unpublished directives, platforms will err on the side of removal. It is the predictable logic of risk management. When liability is unclear, speech becomes expendable.

A second shift expands the scope of state oversight far beyond traditional publishers. Amendments to Rule 8 bring ordinary users who post or share news and current affairs content within the ambit of the government's oversight mechanism. This includes the Inter-Departmental Committee, a body empowered to review content and recommend blocking.

This is not merely an administrative adjustment. It reintroduces, through a different route, a regulatory framework that has already faced judicial scrutiny. In 2021, the Bombay High Court stayed key provisions of the IT Rules, citing concerns under Article 19(1)(a) of the Constitution. The Madras High Court later observed that such oversight could undermine media independence. Those challenges remain pending. Yet, the new draft effectively reconstructs the same architecture while those questions are unresolved.

An undefined role

Equally troubling is the transformation of the Inter-Departmental Committee itself. Originally designed to address grievances, it is now empowered to examine any "matter" referred by the Ministry of Information and Broadcasting. The term is left undefined. A procedure is currently in place under Rule 14 but compliance remains an issue. There is no clear threshold for intervention, and no guarantee that affected users will be heard before action is taken.

This shift from grievance redress to proactive scrutiny changes the character of the body. It becomes less a forum for dispute resolution and more an instrument of preemptive control.

The third major concern lies in expanded data retention obligations. The draft clarifies that platform duties to retain user data operate in addition to requirements under any other law. In practice, this could mean that personal data, browsing activity and communication records are stored for extended periods, potentially years, depending on overlapping legal mandates.

The risks here are not abstract. Longer retention increases the surface area for misuse, whether through unauthorised access, data breaches or function creep. It also alters the relationship between citizens and digital spaces. When every interaction may be archived indefinitely, self-censorship follows naturally.

Taken together, these amendments signal a shift toward a model where executive discretion plays a dominant role in shaping online speech. The concern is not only about individual provisions but about their cumulative effect. Each change reinforces the other. Informal directives gain force through safe harbour rules. Oversight expands to include ordinary users. Data retention deepens the state's informational reach.

Upsetting the balance

Supporters of the policy may argue that governments require flexible tools to manage harmful content. That is true in principle. But constitutional systems impose limits on how that power is exercised. Delegated legislation must remain within the bounds of its parent statute, a principle affirmed in cases such as *Indian Express Newspapers vs Union of India* (1986). When rules begin to create new obligations that are not clearly grounded in law, the balance between regulation and overreach begins to tilt.

The short public consultation period, which ended on April 14, only heightens the concern. Changes of this magnitude deserve wider debate, legislative scrutiny and careful alignment with existing judicial rulings.

India's digital public sphere has grown precisely because it has allowed a diversity of voices, from professional journalists to ordinary citizens. That openness has always required some regulation. The question now is whether the new rules preserve that openness or narrow it through administrative control.

The answer will shape not only how platforms operate but also how freely citizens can speak, critique, and participate in public life.

GS Paper II – Governance

Can middle school students engage with AI?

Mamidala Jagadesh Kumar

Chairman, Review Committee for NEP 2020, Ministry of Education and former Chairman, UGC. Views are personal

Recently, the Central Board of Secondary Education (CBSE) decided to introduce a Computational Thinking (CT) and Artificial Intelligence (AI) curriculum for classes 3-8, which will begin from the 2026-27 academic session. CT skills generally refer to abstraction, decomposition, pattern recognition, and algorithmic thinking. These skills are required to reason about intelligent systems and to understand how machine learning differs from rule-based computation. As with any transformational reform in education, it is necessary to examine the practicality of introducing computational concepts to middle school learners. Will it align with age-appropriate pedagogy for engaging with emerging digital and computational environments?

Global precedents

One first has to examine whether CBSE's curriculum clearly links CT and AI, since such a relationship is conceptually necessary. The foundational design principle behind the Organisation for Economic Co-operation and Development and the European Commission's AI Literacy Framework identifies CT as a precursor to AI learning. This framework recommends CT competencies across age bands beginning from early primary school. Similarly, the AI4K12 Initiative in the U.S. places CT-related competencies at the base of its "Five Big Ideas in AI." Their CT-competencies progression plan spans K-2, 3-5, 6-8, and 9-12 grade bands. The CBSE's sequencing broadly aligns with these comparative curricular architectures. However, its curriculum is designed independently in line with the National Education Policy (NEP), 2020 and the National Curriculum Framework for School Education (NCF-SE), 2023.

UNESCO also identifies topics such as "What is AI?", "Foundations of computing", and "Data literacy" as necessary for school students. Learners need to start cultivating logical thinking from an early stage and gradually build problem-solving skills. They also need opportunities to develop a basic understanding of AI as part of their broader digital learning.

The CBSE curriculum includes introductory discussions on AI fairness, responsible use, and digital safety. This focus is broadly consistent with cross-national practices

Tackling inherent risks

There are, of course, risks associated with children interacting with AI. The CBSE curriculum includes introductory discussions on AI fairness, responsible use, and digital safety. This focus is broadly consistent with cross-national practices. For instance, the AI4K12 guidelines include topics such as recognising when AI systems may mislead; identifying bias in datasets; and distinguishing between AI and human capabilities across all age groups. But can children meaningfully engage with such content at a young age? Classroom-based interventions, including studies conducted in U.S. middle schools, led to interesting outcomes. They suggest that learners in the 11-13 age group can engage with AI ideas when supported by structured pedagogical interventions. These studies reveal that introducing ethical dimensions of AI at this stage can be pedagogically feasible.

A growing body of empirical research suggests that introducing concepts such as supervised learning or predictive modelling is viable for learners in the 11-14 age group. Many comprehensive research studies on AI in K-12 education suggest that school-age participants as young as 10-12 years can work with fundamental AI concepts. Thus, the CBSE's CT-AI framework appears compatible with the learning capacities observed in this age group.

Many international initiatives encourage the use of no-code tools for introductory AI learning. Multiple empirical studies show that by using such tools, middle school learners can design, build, test, and reflect on their projects without coding. For this reason, the CBSE's expectation that Class 8 students can attempt to solve real-world problems using no-code tools is supported by several international initiatives.

However, children may start attributing human-like traits or capabilities to AI tools, although these tools do not actually possess them. Does the CBSE curriculum address this challenge by creating awareness among children? The CBSE's curriculum contains topics discussing ethical use, fairness, and responsible digital behaviour. Such discussions can help reduce children's misconceptions about AI. These modules can support better understanding and the prudent use of AI systems.

The CBSE curriculum follows a cross-disciplinary design by integrating CT into Mathematics and 'The World Around Us' course for Classes 3-5. Global experiences which involved cross-disciplinary instructional models reported improvements in students' reasoning and problem-solving in several contexts. The CBSE's pedagogical orientation reflects similar design principles.

Away from rote learning

One problem in Indian education is the habit of rote learning. CT and AI learning have the potential to encourage inquiry-driven, reflective learning rather than traditional rote-based methods. The CBSE curriculum emphasises practical modelling, reflection, and ethical reasoning. This approach can therefore contribute to ongoing efforts to move classroom practices away from rote-based methods.

International practices and available research suggests that middle school is an appropriate stage to introduce foundational CT-AI elements. The CBSE's CT-AI curriculum is structured to make thoughtful and effective use of this developmental stage in learners' growth, and it exhibits coherence with the vision of the NEP 2020.

GS Paper II – International Relations

The evolving China-Pakistan space cooperation

The 'all-weather ties' between China and Pakistan are reflected in their space cooperation as well

Gunjan Singh

The Chinese space programme has undertaken major strides since it built and launched its first satellite in 1970. In last half a century Beijing has conducted satellite launches, built its own navigation system, carried out successful spacewalks, and built and operated its own space station. China is also in the process of undertaking a manned moon mission by 2030. China has also consistently promoted its space technologies and pushed for cooperation under Belt and Road Initiative (BRI). This entails "a service network weaved by satellites and ground stations among the BRI partner countries has promoted the space industry to better benefit the local people". China has also used its launching platform, the Long March, to promote its soft power by launching satellite for a number of other countries.

The 'all-weather friendship' between China and Pakistan has been replicated in their space cooperation as well. The partnership began in 1990 with China launching Pakistan's Badr-I satellite. Today, China has built and launched satellites for Pakistan and in 2026 announced that it will send one Pakistani astronaut to the Tiangong space station.

Lunar mission and satellite launches

China has selected Muhammad Zeeshan Ali and Khurram Daud, two Pakistani candidates who will be trained in China for a visit to the Tiangong space station. However, only one of them will be visiting the space station as the payload specialist. This is being done under the 2025 agreement between the China Manned Space Engineering Office (CMSEO) and the Pakistan Space and Upper Atmosphere Research Commission.

China had also launched the ICUBE-Q in 2024 on Chang'e 6 orbiter. This was developed in a collaboration between the Pakistan's Institute of Space Technology (IST) and Shanghai Jiao Tong University (SJTU). The ICUBE-Q, a lunar CubeSat weighing about 7kg was to explore the far side of the moon. It was successful in capturing images of the moon and the sun and transmitting them back to Earth.

China has been the only country which has launched a number of Pakistani satellites in the last two decades. This has helped Pakistan build a network of reconnaissance and communication satellite network. The latest mission in April 2026 saw Pakistan's indigenous electro-optical satellite, EO-3 being launched from China's Taiyuan Satellite Launch Center. In 2025 China had launched three Pakistani satellites, a remote-sensing satellite (PRSS-2) in October 2025, Pakistan Remote Sensing Satellite (PRSS-1) in July 2025 and PRSC-EO1 in January 2025. In 2024 China had launched the second communication satellite for Pakistan, PakSat MM1. The first Pakistani communication satellite PAKSAT-IR was launched in 2011.

Navigation cooperation

BeiDou Navigation Satellite System (BDS) is China's indigenous navigation system. It is also seen as the plausible alternative to the United States, Global Positioning System (GPS). The BeiDou system is considered to be very precise with providing information with 2 centimetres precision and this can be improved to 5 millimetres after image processing. This can be very helpful in disaster relief, urban planning, traffic guidance as well as environmental management. In 2014 Pakistan became the first foreign country to use the BeiDou navigation system.

Under the China-Pakistan defence cooperation, the Pakistani military is all equipped to use the BeiDou system. In 2020 Chinese Satellite Navigation Office (CSNO) had announced that they will be establishing a Continuously Operating Radar Station (CORS) network in Pakistan which will be BeiDou enabled.

The developments highlight that the ties between China and Pakistan has moved to the space arena as well, giving Islamabad a strategic advantage. The dual nature of space technology also helps Pakistan gain access to better navigation, telecommunication and disaster relief.

(Dr. Gunjan Singh is an Associate Professor at OP Jindal Global University.)

THE GIST

- The China-Pakistan space partnership began in 1990 with China launching Pakistan's Badr-I satellite.
- China has been the only country which has launched a number of Pakistani satellites in the last two decades. Additionally, under the China-Pakistan defence cooperation, the Pakistani military is all equipped to use the BeiDou navigation system.

GS Paper II – Governance

NITI Aayog revamp shows tilt towards science and health

Jacob Koshy
NEW DELHI

The revamp of the NITI Aayog last week with a new set of full-time members shows a tilt towards technology and health sectors.

Usually, the choice for the think tank has leaned towards economists.

Three of the five new members – Abhay Karandikar, M. Srinivas, and Gobardhan Das – have had long careers in health, biotechnology, and science.

Mr. Karandikar, who is currently the Secretary of the Department of Science and Technology, was previously the Director of the Indian Institute of Technology, Kanpur and Professor of electrical engineering at the Indian Institute of Technology, Mumbai.

Dr. Srinivas, until recently, was the Director of the All India Institute of Medical Sciences, Delhi.

Mr. Das, who is currently the Director of the Indian Institute of Science Education and Research, Bhopal, was Professor, School of Molecular Medicine, Jawaharlal Nehru University. He was also the BJP's candidate in the 2021 West Bengal Assembly election but quit the party prior to joining the institute in Bhopal.

Prime Minister Modi meets the newly appointed Vice Chairman of NITI Aayog, Ashok Lahiri.

One of the other two full-time members is an economist. K.V. Raju is currently member of the Economic Advisory Council to the Prime Minister. He specialises in agricultural policy, rural development, and water policy.

The other full-time member is Rajeev Gauba, a former Cabinet Secretary.

The NITI Ayog's newly appointed Vice-Chairman, Ashok Lahiri, is an economist. He was the Chief Economic Adviser from 2002 to 2007 and has served at several international policy institutions, including the World Bank and the IMF.

Like Mr. Das, he was a BJP candidate in the 2021 West Bengal election, the difference being that he won and is the MLA from Balurghat.

GS Paper II – Polity

RBI tightens bad loan rules to align with global norms

Ashokamithran T.
MUMBAI

The Reserve Bank of India (RBI) has rejigged the rules governing classification of bad loans, definition, and recovery, to align with globally-accepted standards, effective April 1, 2027, according to the Master Directions released on Monday.

According to one of the revised directions, if one loan of a borrower with many loans is classified as a non-performing asset (NPA), all the other loans would also be considered so. The basis for classifying a loan as NPA, however, remains at 90 days overdue. An NPA borrower will be considered a "standard asset" only "on repayment of entire arrears of interest and principal pertaining to all the credit facilities," as per the revised norms.

The new regulation also directs banks to establish automated systems to identify NPAs.

GS Paper II – Governance

TRAI attempts to promote public WiFi hotspots, again

NEWS ANALYSIS

Aroon Deep
NEW DELHI

Since at first it did not succeed, TRAI's trying again. The Telecom Regulatory Authority of India (TRAI) came out with a consultation paper seeking a response to the question it asked in 2016: how can public WiFi hotspots take off? As the three private telcos steadily implement tariff hikes, this may be a timely shot at a familiar problem for the government.

Public hotspots have been beset by many issues. For one, WiFi access/gigabyte is far cheaper than even Indian mobile data prices but mobile data is still pretty inexpensive, constraining demand at scale. A second issue is telcos and Internet service providers' aggressive campaign against public WiFi, by charging them enterprise-leased line rates costing lakhs a year, pricing out small shops where access points can make a difference.

Hotspot ID friction

But the bigger issue may be is the government's insistence on complete visibility of the identity of every individual connecting to a WiFi hotspot with an OTP or some other form of ID verification. This norm was put in place in 2009 and has no equals in most

Public hotspots have been beset by many issues.

of the world. The 2009 requirements followed terrorist attacks in Ahmedabad and Mumbai. but their utility in signals intelligence and combating crime is questionable.

TRAI's paper moots a "super-aggregator" to facilitate "inter-hotspot roaming" and "a centralised-platform-for-authentication" authentification.

ISP pushback

Further centralisation and more efficient surveillance of WiFi hotspots has been tried. The results speak for themselves. The PM-WANI architecture targeted 10 lakh hotspots under a Public Data Office- type arrangement. To date, less than half that number has been rolled out, four years after the deadline.

Fixed line connections still cost money to build and is usually the post-network build-out generation that leverages the abundance of the networks to support public goods like WiFi hotspots. India had only about 4.6 crore fixed line Internet connections as of March.

The commercial paranoia among licensed operators is still an obstruction. TRAI is asking what commercial sops could be given to shop owners and establishments. Prohibition of leased line-level tariffs for hotspot providers may have eased some deployment friction. The regulator also flagged right-of-way issues and coordination with municipal bodies as a friction point.

Free hotspots

Building WiFi hotspots in India is not comparable with doing so in a developed nation. The issue is deployers want a business case and can't (or won't) generally fold WiFi into other operating costs. WiFi hotspots are usually free elsewhere. This alone distinguishes our hotspot efforts from any other market.

But, persistence is in the interests of the Indian Internet. Mobile networks can get crowded, and offloading heavy usage to conveniently-accessible and negligibly-priced WiFi networks can free up licensed spectrum for mobility. These are sticky issues around which the regulator has held two substantive consultations in the last 10 years already. Perhaps the third TRAI paper is the charm.

GS Paper III – Economy

Disqualify legislators who cross-voted in RS poll: BJD

Invoking anti-defection law under Tenth Schedule, party submits 8 separate petitions to Speaker, cites earlier precedents such as in Himachal; legislators say motive is to keep them under pressure

Satyasundar Barik
BHUBANESWAR

The Biju Janata Dal (BJD) on Monday met Odisha Assembly Speaker Surama Padhy and demanded disqualification of eight MLAs who, it said, had voted against the party line in the Rajya Sabha election held last month.

Eight separate petitions were submitted to the Speaker to disqualify the legislators - Chakramani Kanhar, Naba Kishore Mallick, Souvic Biswal, Subasini Jen, Ramakanta Bhoi, Devi Ranjan Tripathy, Arvind Mohapatra and Sanatan Mahakud.

Two candidates of the Bharatiya Janata Party (BJP) secured smooth victories in the March 16 election while the BJD comfortably sent its lone candidate. The fourth candidate, backed by the BJD and Congress, could not make it as 11 MLAs, including eight from BJD and three from Congress, voted in favour of the fourth candidate Dilip Ray, an Independent backed by the BJP.

A videograb of the scuffle that broke out between MLAs of the BJD and BJP amid Rajya Sabha voting, in Bhubaneswar. FILE PHOTO

"We have requested the Speaker to disqualify these eight MLAs for going against the party line in the Rajya Sabha election. We also want these MLAs to tender resignation on their own and seek fresh mandate from their respective constituencies," said Pramila Mallick, BJD chief whip in the Assembly.

MLAs defiant

Some of the MLAs named hit out at the party's move. "The motive behind seeking our disqualification is to keep MLAs under pressure and force them to bow down before V.K. Pandian [an aide of former CM Naveen Patnaik], who still has grip over the party," said Mr. Tripathy.

The BJD has invoked the anti-defection law under the Tenth Schedule, which states that a legislator is deemed to have defected if he either voluntarily gives up the membership of his party or disobeys the directives of the party leadership on a vote. "It implies that a legislator defying (abstaining or voting against) the party whip on any issue can lose his membership of the House. The law applies to both Parliament and State Assemblies," it says.

The disqualification of six Congress MLAs by the Himachal Pradesh Speaker in 2024 for cross-voting in Rajya Sabha election and disqualification of Sharad Yadav by Rajya Sabha Chairman Venkaiah Naidu in 2017 for defying his party Janata Dal (United)'s directives and attending events of Opposition parties were produced as references for taking action against the BJD MLAs.

GS Paper III – Science & Technology

CAR-T cell therapy senses 'faint' targets to clear solid tumours

Scientists have developed a highly sensitive receptor that can detect trace amounts of proteins on solid tumours, overcoming a major biological hurdle to using CAR T-cell therapy against cancers such as kidney or ovarian cancer; this can help eliminate previously undetectable tumour cells

Anirban Mukhopadhyay

Chimeric antigen receptor (CAR) T-cell therapy, an approach that modifies a patient's own immune cells to hunt down cancer, has transformed treatment for blood cancers such as leukaemia and lymphoma. But the same strategy has struggled when applied to solid tumours such as kidney or ovarian cancer.

One of the biggest obstacles is antigen heterogeneity. Tumours are not made of identical cells. Instead, they resemble a patchwork: some cells display the protein that CAR-T cells detect while others appear to lack it. CAR-T cells only destroy 'visible' targets, so the invisible cells survive and allow the cancer to grow back.

Now, a study published in *Science* on February 26 has suggested these supposedly invisible cells may not be invisible after all. Many tumour cells thought to lack the target protein actually carry small amounts – too little for current CAR-T cells to detect.

The hidden protein

The study conducted by researchers in Columbia University and the Sloan Kettering Cancer Centre in New York focused on a protein called CD70. It is expressed by the tumours in about 70-80% of kidney and ovarian cancers and roughly a quarter of pancreatic cancers, making it an attractive target for immune therapy.

But in real world scenarios, some cells carry large quantities of CD70 while others appear negative in standard laboratory tests.

The researchers suspected that these negative cells might still produce small amounts of the protein.

To check this, they examined individual tumour cells and studied how the gene for CD70 was being regulated. They discovered that it was being suppressed by an enzyme called EZH2, which chemically modifies proteins around DNA.

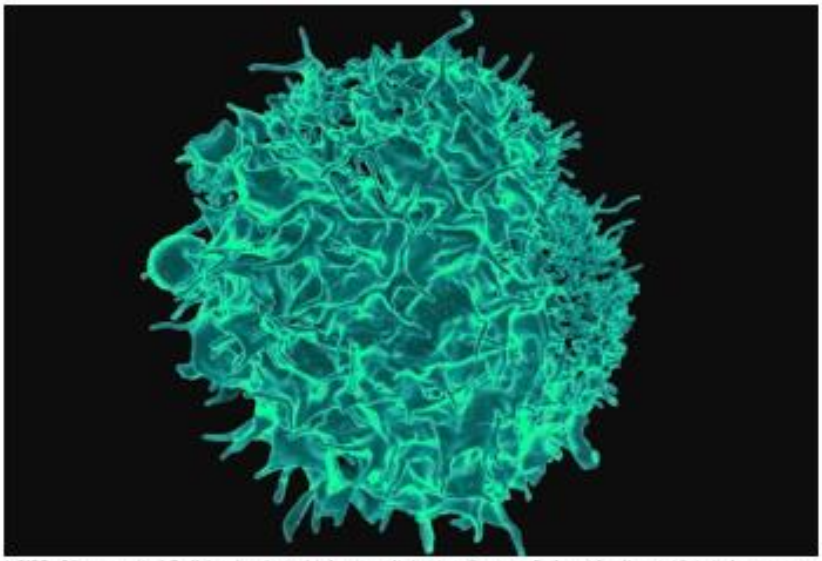
These modifications tighten the DNA structure, making it difficult for the cell to read the gene and reducing CD70 production to very low levels. This effectively dimmed the signal, making the cells undetectable to current immune therapies.

Detailed imaging in two kidney cancer models found more than 80-90% of tumour cells that appeared CD70-negative by conventional tests still carried detectable amounts of the protein.

Scott Lowe, a cancer biologist at the Sloan Kettering Institute, said tumours may keep these tiny amounts of the protein because they still need it to survive. "If the cancer cells need some of the protein to stay viable, there may be evolutionary pressure to keep it at very low levels rather than lose it completely," he said.

The researchers called this phenomenon 'pseudo-heterogeneity' – the target protein is present in nearly all tumour cells but sometimes at levels too low for detection.

If cancer cells hide the target rather than eliminate it, the solution may be to build immune cells that detect faint signals.



In CAR T-cell therapy, a patient's T cells (one shown) are isolated, engineered to target specific cancer cells, then reinfused to mount their attack. GETTY IMAGES/ISTOCK

Making T-cells more sensitive

To do this, the researchers developed a new receptor design called an HLA-independent T-cell (HIT) receptor.

Traditional CAR-T cells use receptors with molecular components that tell the immune cell when to attack. These triggers usually require a strong signal, meaning many copies of the target protein must be present on a cancer cell to elicit a response from T-cells.

The HIT receptor takes a different approach. Instead of changing the strength of the signal, it connects the cancer-detecting sensor directly to the T-cell's natural activation pathway – the internal system T-cells normally use to recognise infected cells – while bypassing the HLA system, the genetic ID tag that T-cells usually require to identify a target.

By co-opting this natural machinery, the receptor becomes able to detect antigens at much lower densities than a synthetic CAR.

A cancer biologist who peer-reviewed the study for the journal said anonymously that the finding could change how CAR-T therapies are designed: "If this principle holds for other tumour targets, it could change how we design CAR-T therapies. Instead of searching for perfectly uniform targets, we may need receptors that can detect very low levels of antigen."

Testing the idea

The team tested the approach using xenograft models, in which real human tumour tissue is implanted in mice. These models closely mimic the complexity of cancers found in patients.

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> SCOTT LOWE
> Cancer biologist at the Sloan Kettering Institute

In kidney cancer models, conventional CAR-T cells initially shrank tumours but eventually failed. The remaining cancer cells, those with extremely low CD70 levels, survived and allowed the tumour to grow back.

The T-cells with the HIT receptor however eliminated these previously undetectable tumour cells. The researchers also observed complete and lasting tumour eradication in several models of kidney, ovarian, and pancreatic cancer with these T-cells.

Power versus safety

Increasing sensitivity raised one concern, however: "When you make immune cells better at detecting weak signals, you also have to be careful they don't start reacting to normal cells that carry small amounts of the same protein," the researcher quoted earlier said.

This problem is often called the "Goldilocks challenge" of cell therapy. To evaluate this risk, the researchers analysed a large single-cell atlas of 30 human tissues and 222 different cell types, finding that CD70 activity was largely absent from most vital organs such as the heart, lungs, and brain.

A significant exception was activated immune cells, which naturally express CD70 during immune responses. But even in those tissues, the protein appeared only in a small fraction of cells, typically less than 5%.

In experimental models, the engineered T-cells did attack some activated immune cells but the researchers called the effects temporary and manageable.

The biologist noted that future therapies will have to include additional safeguards: "If these treatments move into patients, researchers will likely add safety systems such as molecular switches so doctors can turn the cells off if necessary."

A new hope

Professor Lowe said the finding fits a broader pattern cancer biologists have been observing for years.

There is strong evidence that changes in how genes are turned on or off in cancer cells (without changing the DNA itself) can help tumour cells survive targeted therapies, he said. "These cells, often called drug-tolerant persisters, can tolerate treatment and later allow the tumour to regrow."

The researcher quoted earlier has tempered expectations for now. "It is still a long way from bedside application but if this strategy works in clinical trials, it could help tackle the biggest hurdle in cancer immunotherapy," he said.

As he suggested, for patients with kidney or ovarian tumours, where treatment options are still limited, being able to uncover and eliminate these hidden cells could make a real difference.

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GS Paper III – Environment

Light pollution threatens the world's clearest skies

Associated Press

It takes a moment for the eyes to adjust. A faint spark appears in the darkness; then another, brighter one. Soon, stars, planets and entire constellations emerge. Before long, a whole galaxy stretches across the sky, visible to the naked eye.

In Chile's Atacama Desert, the night sky feels infinite. Considered the driest place on the earth, its darkness is also one of the clearest windows to the universe.

A rare combination of dry climate, high altitude, and isolation from urban light pollution makes the Atacama an unrivalled hub for world-class astronomy and home to the world's largest ground-based astronomical projects.

"The conditions in the Atacama Desert are unique in the world," said Chiara Mazzucchelli, president of the Chilean Astronomical Society. "There are more than 300 clear nights per year, meaning no clouds and no rain."

But these skies may be at risk.

A rare combination of dry climate, high altitude, and isolation from light pollution makes the Atacama a hub for astronomy and home to some of the largest astronomical projects

Last year, the desert became a battleground between scientists and an energy firm proposing a green power complex just kilometres from the Paranal Observatory. Managed by the European Southern Observatory (ESO), the site also is the future home to what is to be the most powerful optical telescope.

Although the energy project was cancelled in January following an appeal from astronomers and physicists, it exposed concerns that existing sky preservation laws are outdated and unclear. Since then, several environmental regulations have come under review.

The so-called Photon Valley in Chile is a high-altitude corridor where several observatories operate side by side using some of the most sophisticated instruments ever engineered.

"ESO's telescopes in particular are the most powerful astronomical facilities on the planet," said Itziar de Gregorio-Monsalvo, the ESO representative in Chile.

Every year, the Atacama Desert draws thousands of astronomers and scientists from around the world. "We are lucky to be here," said Julia Bodenheimer, an assistant professor at University of Amsterdam.

Walking across the Atacama's rocky, uneven terrain is no easy task. At altitudes exceeding 3,000 m, oxygen becomes a luxury, while scorching days give way to relentlessly cold nights. But for space observation, the more than 105,000 sq. km of desert are the perfect setting.

The exceptional conditions of the Atacama have enabled some of the most ambitious astronomical projects ever conceived, like the Extremely Large Telescope, ELT – a $1.5 billion endeavor by ESO scheduled for completion in 2030.

With 798 mirrors and a light-gathering area of nearly 1,000 square metres, the ELT will be 20 times more powerful than today's leading telescopes and 15-times sharper than Hubble Space Telescope.

Twenty years ago, the Atacama Desert was "an ocean of darkness," recalled Eduardo Unda-Sanzana, director of the Astronomy Center at the University of Antofagasta.

Over the years, however, the landscape has changed drastically. Driven by urban sprawl, industrial development, and the arrival of mining and wind farms, the desert has become coveted territory where balance is not always easy to reach.