Tata Communications Limited's response to TRAI Consultation paper on 'the Issues Related to Critical Services in the M2M Sector, and Transfer of Ownership of M2M SIMs'

Preamble

At the outset, we thank TRAI for providing us an opportunity to share our comments/inputs on this important paper for allowing LPWAN / Other technologies based on unlicensed spectrum for providing critical services in M2M sector also. Tata Communications vide its representations had taken up this issue with DoT which have been duly considered even after formation of Inter-Ministerial Working Group (IMWG) who had identified a list of 20 services as critical services in M2M Sector (*as specified in para 2.16 of the paper on page no 20 & 21*) which has to be mandatorily provided through connectivity providers using licensed spectrum in March 2021. DoT agreed to review its position taken earlier basis TRAI recommendation and accordingly, a reference was sent dated 01.01.2024 seeking TRAI revised recommendations on this specific aspect.

As mentioned in the consultation paper, in current scenario definition of critical services is very wide. Each domain or each sector may present a variety of use cases, and each may have their own specific needs. Therefore, it would not be possible to create a criticality framework for every use case in every industry / domain when new use cases frequently emerge. there is no need for a framework for classifying a specific IoT/M2M service as a critical service. In our view, the criticality of M2M services in any domain/ sector should be decided based on the market requirement and criticality of any particular service should be use-case driven and should not be made applicable for the entire domain / sector. However, at the same time, security and reliability of services, and ensuring accountability is paramount.

We strongly believe that due to unique features of LPWAN and LoRaWAN technology (low power requirements and long range), various useful M2M/IOT solutions can be developed, which would play vital role in strengthening the overall M2M / IoT ecosystem in India including critical services. Hence, TRAI is requested to kindly review its earlier recommendation of only using licensed spectrum for critical M2M services.

In view of above preliminary views, our issue wise comments / inputs are as follows:

Q1. Whether there is a need for a broad guiding framework for defining a service as critical M2M/ IoT service? If yes, what should be the guiding framework? Please provide a detailed response with justifications.

Tata Communications' Response:

- As rightly observed by TRAI in the paper, new use cases and fresh innovations are emerging every day in the ever-growing field of M2M & IoT. In this context, it is also pertinent to mention

that presently, M2M and IoT has not even contributed 1% to the global telecommunications market and has huge potential for growth.

- As mentioned in the consultation paper, in current scenario definition of critical services is very wide. Each domain or each sector may present a variety of use cases, and each may have their own specific needs. Therefore, it would not be possible to create a criticality framework for every use case in every industry / domain when new use cases frequently emerge. QoS framework along-with detailed regulatory requirement for specific needs are best understood by the consumer / buyer of services and implementing technologies may comply with the same.

- Unlicensed spectrum has been known to work successfully in PAN and WAN networks across industry lines such asset tracking, smart cities, oil and gas, agriculture, defence and many more. Thus, definition of critical services using licensed / unlicensed for M2M/IoT services should be left to the market forces. Darwin's theory of natural selection and survival of the fittest would hold good here.

- Tata Communications proposes that there is no need for a framework for classifying a specific IoT/M2M service as a critical service. The criticality of M2M services in any domain/ sector should be decided based on the market requirement and criticality of any particular service should be use-case driven and should not be made applicable for the entire domain / sector. However, at the same time, security and reliability of services, and ensuring accountability is paramount. This may be done though already existing the provisions of M2MSP, UL-M2M SA and the proposed National Trush Center for IoT. This will provide necessary transparency to the consumers of IoT services.

- A criticality framework may have other adverse impacts:
  a. This will increase the cost of the solution, over engineering
  b. Delays in cases where it is difficult to ascertain if a use case is critical or not.

Q2. Through the recommendation No. 5.1(g) of the TRAI's recommendations on 'Spectrum, Roaming and QoS related requirements in Machine-to-Machine (M2M) Communications' dated 05.09.2017, TRAI had recommended that critical services in the M2M sector should be mandated to be provided only by connectivity providers using licensed spectrum. Whether this recommendation requires a review? Specifically, whether critical services in the M2M sector should be permitted to be provided by using unlicensed spectrum as well? Please provide a detailed response with justifications.

Tata Communications' Response:

- Tata Communications Limited (Tata Communications) has made substantial investment to create LoRa Network in India way back in the year 2017 which is presently powering 4 lacs+ IoT end nodes covering more than 50 cities across the country. With its geographic coverage & penetration, widest range, lower power consumption, optimal bandwidth, and lowest cost, LoRa network is one of the key enablers to make smart cities 'smarter'. Tata Communications LoRa network is utilizing the delicensed spectrum band to enable various M2M/IoT applications.

- With the Tata Communications 'Make in India' focus, we are offering various devices and platforms for employee productivity (Access Monitor, Smart ID card), Equipment Efficiency (location tracker), Facility Management (temp & humidity sensor, smoke monitor, smart lighting, energy meter) thereby creating the necessary ecosystem for the proliferation of M2M/IoT services in India. Our LoRa network is also creating digital factories, offering complete IoT stack and caters a varied use cases in the field of health & Safety, logistics, monitoring, Industrial IoT.

- In view of above backdrop, regarding Critical Services, we would like to refer TRAI recommendations dated 5th September 2017 on 'Spectrum, Roaming and QoS related requirements in Machine-to-Machine (M2M) Communications' wherein TRAI had recommended that:

  Government, through DoT, should identify critical services in M2M sector and these services should be mandated to be provided only by connectivity providers using licensed spectrum (5.1g)

  Further, Guidelines issued by DOT vide O.M. dated 08-02-2022 for Registration Process of M2M Service Providers also states that:

  In future, Authority may identify critical services in M2M sector and instructions issued in this regard shall be binding on Registrant (Chapter III, Clause (6))

- Thus, the above recommendation of TRAI restricts the M2M Service Providers who have created the IoT LoRa network using delicensed spectrum for providing the M2M/IoT Services which would be considered/identified as 'Critical' by the Government. Such kind of practice undermine the principles of level playing field and stifling innovation in the IoT/M2M sector. Moreover, any restrictive policy, stringent regulations may result in following undesirable outcomes:
  o Go against National Digital Communication Policy-2018 which had following mission:
    - Earmarking adequate licensed and unlicensed spectrum for IoT/ M2M services
    - Encourage use of emerging technologies in fields such as Internet of Things
    - Simplifying licensing and regulatory frameworks whilst ensuring appropriate security frameworks for IoT/ M2M/ future services and network elements incorporating international best practices.
  o Hamper growth of markets, innovations, start-up eco system and R&D
  o Reduce Affordability of the solutions specially in remote areas & rural areas where network penetration is limited.

- In our view, a balanced approach of utilizing both licensed and unlicensed bands in many scenarios is the best way to achieve improved customer experience, drive innovation and increase affordability. As per various analyst reports LPWAN technologies are omnipresent and are expected to grow Year on Year (refer table below).

LPWAN connections by technology - Worldwide, 2018-2024
(thousands of connections)

	2018	2019	2020	2021	2022	2023	2024
LoRa	78,339	1,18,303	1,54,835	2,13,281	3,01,808	4,33,890	6,26,245
Sigfox	6,155	14,783	28,197	54,272	1,00,326	1,73,828	2,90,568
NB-IoT	30,677	80,840	1,68,462	2,78,238	3,97,581	5,34,373	6,94,758
LTE-M	3,743	10,523	17,903	26,853	41,428	60,123	84,686
Other	34,123	36,518	39,771	43,775	49,217	55,650	63,117
Grand total	**1,53,037**	**2,60,966**	**4,09,167**	**6,16,420**	**8,90,361**	**12,57,864**	**17,59,374**

- We strongly believe that due to unique features of LPWAN and LoRaWAN technology (low power requirements and long range), various useful M2M/IOT solutions can be developed, which would play vital role in strengthening the overall M2M / IoT ecosystem in India including critical services. Hence, TRAI is requested to kindly review its earlier recommendation of only using licensed spectrum for critical M2M services. The criticality of M2M services in any domain/ sector/use case may be decided on the market requirement and needs of the user. Any technology that may meet QoS and SLA needs agreed with user may be deployed for critical M2M Services. Such selection may be made on case-to-case basis.

- There are 163 LoRaWAN Network Operators in 177 Countries. The Global LoRaWAN Market was valued at US$ 253 Mn in 2018 and is projected to reach US$ 5557.2 Mn by 2026. LoRa and LoRaWAN Devices Market size is projected to reach $6.2 billion by 2026, and it is estimated to grow at a CAGR 36.5% during 2021-2026. Advancement of LoRaWAN device roaming now in more than 25 countries, including satellite connectivity, which seamlessly interconnects Private and Public networks.

- It is also pertinent to highlight the trends on advancements happening in LoRa technology globally. Hyper clouds like AWS are actively investing in LoRa. In last two years they have launched Fully Managed LoRaWAN Network Server[1] and Amazon Sidewalk enables low-bandwidth and long-range connectivity at home and beyond using Bluetooth LE for short-distance communication and LoRa[2]. Other Advancements and case studies includes 5G and LoRaWAN integration[3], Indoor – Outdoor Trackers work better on LoRa than GSM and the new LoRa Edge™ LR1120 enables satellite-based networks and simplifies terrestrial network interoperability.

- Globally all low bandwidth IoT applications are catered by both LPWAN based connectivity providers as well as MNOs while high bandwidth applications can be catered only by MNOs. For a user of any IoT applications, all such applications would be critical only and therefore, mandate to obtain licensed spectrum to offer the Critical IoT / M2M services, would make the entire business model of LoRa WAN based M2M/IoT services commercially unviable. There are no global practices which identify and segregate critical services to be provided only on the licensed spectrum. Several examples of critical services in different sectors in India and

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[1] https://aws.amazon.com/iot-core/lorawan/
[2] https://docs.aws.amazon.com/iot/latest/developerguide/iot-sidewalk.html
[3] https://blog.semtech.com/milesights-5g-aiot-network-camera-demonstrated-the-integration-potential-of-5g-and-lorawan

across globe including Satellite Communication & Defence Sector. Please also refer **Appendix–1** for global practices having implemented implement specific regulatory frameworks overseeing the use of unlicensed spectrum for LPWAN and M2M communications.

- In India unreliable coverage of GSM / LTE networks is also a fact. Whereas LPWAN can be reinforced much more easily. It is also pertinent to mention that Technologies on LPWAN are designed to deliver SLA/KPI similar to conventional licensed spectrum-based technologies. Therefore, if Government restricts offering of critical services only through connectivity providers using licensed spectrum, this would be significantly restricting the market opportunity / scope for M2M Service Providers, who have created the IoT LoRa network using delicensed spectrum for providing the M2M/IoT Services for they would not be allowed to service applications which would be considered/identified as 'Critical' by the Government. There are various success stories of LoRaWAN Deployments especially in Industrial Sector. Please refer **Appendix-2** for details.

- Please also see **Appendix-3** for Tata Communications comments along with examples for various sector specific critical applications as identified by Inter-Ministerial Working Group (IMWG).

- Any approach towards 'Digital Transformation' by leveraging various applications should be technology agnostic rather than prescribing any specific technology/spectrum band to support the use cases in M2M/IoT domain. Tata Communications' IoT LoRa network based on LPWAN technology is capable to support various use cases in different economic and social verticals including critical services hence, along with 4G/5G, other alternate technologies e.g. LPWAN based connectivity network should be equally considered and make part of any roadmap of DoT to achieve the 'Digital Transformation' and support the 'M2M/IoT' use cases.

Q3. Whether there is a need to bring M2M devices under the Trusted Source/ Trusted Product framework? If yes, which of the following devices should be brought under the Trusted Source/ Trusted Product framework:

 a) **All M2M devices to be used in India; or**
 b) **All M2M devices to be used for critical IoT/ M2M services in India;**
  or
 c) **Any other (please specify)?**

Please provide a detailed response with justifications.

Tata Communications' Response:

In our view, there is no need prescribe the Trusted Source / Trusted Product framework for M2M devices. Following is the justification for the same -
- The performance and reliability of a deployment is not always determined by the technology used. It is determined by the provisions made in the solution. This is ensured by the provider of the solution and monitored by the consumer of the solution.

- The accountability and security are two key aspects of the M2M framework:

    o Accountability requirements are met by M2MSP guidelines and UL-M2M provisions. Compliance to these conditions would be sufficient to meet the requisite requirements.

    o Declaration and compliance to approve security frame works and guidelines for compliance may be issued to be included in requirements/ RFPs.

    o Proposed National Trust Centre for M2M services encompassing all stakeholders in the values chain may provide such transparency to the ecosystem and ensure security at various levels and applications.

    o Security needs for different applications may be different and dependent on use case. Any mandates may lead to increased costs and delays and ultimately impact the growth of the sector.

Q4. Whether there is a need for establishing a regulatory framework for the transfer of ownership of M2M SIMs among M2MSPs? If yes,-
a) What should be the saliant features of such a framework?
b) In which scenarios, the transfer of ownership of M2M SIMs should be permitted?
c) What measures should be taken to avoid any misuse of this facility?
d) What flexibility should be given to a new M2MSP for providing connectivity to the existing customers?
Please provide a detailed response with justifications.

Tata Communications' Response:

- Yes, there is a need for establishing a regulatory framework for the transfer of ownership of M2M SIMs among M2MSPs to avoid service disruptions and inconvenience to users.
- The transfer of ownership of M2M SIMs should be permitted in following scenarios:
    o Involving mergers, acquisitions, takeovers of companies.
    o For cases where companies wish to transfer the ownership from the parent company to its subsidiaries/ other group companies or vice versa and between its subsidiaries/ group companies.
    o For cases where M2MSP is ceasing its operations or is filing for bankruptcy, etc. and the M2M SIMs are required to be either transferred to the new M2MSP or directly to the company where M2M SIMs are used/deployed.
    o Allow transfer of ownership of M2M bulk SIMs from one M2MSP to another M2MSP considering the complaints / issues raised by the Third-Party users (Customer of M2MSPs).

a) What should be the saliant features of such a framework?
Enterprise customer should have the flexibility to choose the service provider of their choice, so like the Mobile number portability option available for consumer, similar option should be made available in case of IOT so that if the customer decides to switch the service from an existing service provider to the new service provider the existing service provider has to cooperate and make the experience seamless to the enterprise customer. Today switching

from one provider to another provider is very difficult because of the hard constraint around SIM credential ownership etc. Once the SIM ownership is transferred the new service provider is liable to take care of the KYC procedure.

b) In which scenarios, the transfer of ownership of M2M SIMs should be permitted? –
- Enterprise customer wants to switch to a new service provider due to cost advantage
- The existing service provider coverage in the service area is very poor or is not as per the enterprise customers expectations
- The existing service provider is unable to serve the market and is shutting down their operations in India.

c) What measures should be taken to avoid any misuse of this facility?
- The assumption here is the service is given to the enterprise customer and the shifting from one M2MSP to another M2MSP is decided by the enterprise customer for any of the scenario stated above in response to para (b) above.
- Thus, for any shifting from one M2MSP to another M2MSP, the enterprise customer should initiate the switching. The existing service provider should be given 3 months' notice before the shifting from one M2MSP to another M2MSP is approved and initiated.

d) What flexibility should be given to a new M2MSP for providing connectivity to the existing customers?
- The major dependency in IoT service is on the MNO to provide the coverage, M2MSP should be allowed to integrate their SMDP / SR with the MNO giving them the equal opportunity to compete in the market with MNO.
- IoT offerings / commercials should also be regulated and controlled by the regulatory body to avoid MNO's creating entry barriers for M2MSP.

Q5. Whether there are any other relevant issues relating to M2M/ IoT services sector which require to be addressed at this stage? Please provide a detailed response with justifications.

Tata Communications' Response:

In response to this question, we would like to submit as follows:
- The permanent roaming of foreign eUICC fitted devices in India should not be restricted for a time limit for M2M services and same should be left to the market forces and mutual roaming agreements between foreign TSPs and Indian TSPs. However, in case a timeline is being prescribed for roaming of foreign eUICC fitted devices in India, then the TRAI earlier recommended period of three years vide its earlier recommendations dated 05-09-2017 should be continued and same need not be reduced. This will enable sufficient time to end user and M2MSP to get the services transferred, without any service disruption thereby impacting end customers. This will enable sufficient time to end user and M2MSP to get the services transferred, without any service disruption thereby impacting end customers.
- TRAI in its recommendations dated 22-02-2024 had mentioned that the SM-DP, SM-SR, or SMDP+ are part of GSMA approved ecosystem for remote provisioning of M2M eSIMs is a secure system. In many countries of the world, SM-SR is owned and managed by either a TSP or an original equipment manufacturer (OEM) or a third party such as M2MSP. However,

considering the crucial role played by SM-SR in the M2M services eco-system, and the need for an adequate security of M2M eco-system in India, the TRAI is of the view that the provision of SM-SR should be under an adequate regulatory oversight. Accordingly, the Authority is of the view that an M2MSP registrant may be permitted to own and manage SM-SR in the country if it is a company registered under the Indian Companies Act. TRAI has formulated additional terms and conditions (refer page no 79 to 81 of the TRAI recommendations) to be fulfilled by M2MSP registrants, if they intend to own and manage SM-SR in India. For existing M2MSP, if it is an Indian company registered under the Indian Companies Act may separately seek permission for owning and managing SM-SRs in India. SM-DP will continue to be host and own by licensed telecom service providers. In this regard, it is submitted that as recommended, GSMA standards for SM-SR and SM-DP should be followed in India and M2M-SPs should be allowed to have their own SM-SR and SM-DP subject to conformance to GSMA standards. This will provide great flexibility to OEMs/ M2M users on their choices. It should be mandated that any entity (e.g. M2M-SP) must operate a GSMA certified SM-SR & SM-DP. Further, in case of M2MSP or its parent company also having either UL-M2M or UL-VNO (AS) license, should not require to seek any permission from DoT to deploy SM-DP and SM-SR for this purpose. This will save substantial time of seeking approval as M2MSP.

- ITU allocated shared 901.XX (Global IMSI) should continue to be allowed to be used in India. It provides greater flexibility to end-users and will help in meeting global requirements. A suitable light touch regulatory framework may be adopted for a collaborative ecosystem in line with Global practices, while keeping in mind the consumer and national interests. There is no reason for any Regulatory inhibitions for 901 series, if all the concerns can be addressed through suitable technological, regulatory, and commercial framework.

TRAI is requested to kindly review its recommendations dated 22-04-2024 on above issues considering the fact that M2M & IoT sector in India is still at nascent stage and only a light touch regulatory registration framework is needed to support innovation and growth in this sector.

Appendix – 1: Global Practices

Various countries globally implement specific regulatory frameworks overseeing the use of unlicensed spectrum for LPWAN and M2M communications. These regulations may include guidelines on power limits, duty cycles, and technical parameters to ensure fair use and prevent interference.

Different countries may allocate specific frequency bands for unlicensed LPWAN technologies. Examples include the sub-GHz spectrum, such as 868 MHz in Europe and 915 MHz in the United States.

Global standardization bodies, such as the LoRa Alliance and Sigfox, provide standardized protocols for LPWAN technologies. Countries often align their regulations with these standards to ensure interoperability and a global ecosystem.

Some countries actively encourage the deployment of LPWAN technologies through government initiatives, subsidies, or partnerships to promote IoT development and digital innovation.

Many countries involve stakeholders, including technology providers, service operators, and user groups, in the regulatory process to address concerns and gather input.

- United Sates, LPWAN Technologies such as LoRa and Sigfox operate in unlicensed spectrum bands like 915 MHz.

- European Union - Various countries in the EU, including France, Germany, and the UK, permit the use of unlicensed spectrum for LPWAN technologies, adhering to regional standards.

- Japan -has regulations allowing LPWAN technologies in unlicensed spectrum bands for M2M communications.

- South Korea- has embraced LPWAN technologies like LoRa for M2M applications in unlicensed spectrum.

- China – allows the use of unlicensed spectrum for LPWAN technology such as NB-IOT (Narrowband Internet of things).

- Australia- LPWAN technologies like LoRaWAN are used in unlicensed spectrum for M2M applications in Australia. 433 MHz, 915 MHz.

- Canada- LPWAN technologies operate in unlicensed spectrum bands for M2M communications in Canada.

Appendix -2
Success Stories of LoRaWAN Deployments especially in Industrial Sector

Technologies on LPWAN are designed to deliver SLA/KPI similar to conventional licensed spectrum-based technologies. For Government Smart Light Projects, Tata Communications has been able to achieve SLAs and data success rate of 99% on a consistent basis. This shows that LPWAN networks using unlicensed spectrum also offer reliability, and high network availability. In view of the same, LPWAN network is also a viable option especially where GSM / LTE networks are not adequately available and hence should also be allowed for providing connectivity for critical services.

Private networks and purpose-built networks have been very successful in IOT and are growing substantially instead of Operator driven large networks. Notion that a big network providing connectivity to customers has not worked well in IoT. M/s Semtech[4] who is the developer of LoRa (a long-range networking initiative for the Internet of Things), have deployed worldwide more than 5.9 million gateways and 300 million End Nodes with LoRa devices covering 181 public networks. Key critical applications pertaining to various Industries / Sectors listed by Semtech on its website[5] are (a) Smart Industrial Control (b) Smart Utilities (c) Smart Cities (d) Smart Home (e) Smart Healthcare (f) Smart Supply Chain and Logistics (g) Smart Environment (h) Smart Agriculture. LoRa Alliance[6] and other analysts provides similar wide range of sectors and use cases. Most cities/regions in France and Spain are deploying their own LoRaWAN Networks. There are various case studies where LoRaWAN is successfully deployed in **critical** sectors such as Oil and Gas, Health Care, Smart Grids, Smart Cities, Smart Utilities, Smart Agriculture and Smart Home of Tata Communications and Other similarly placed service providers.

While the sectors mentioned in TRAI Paper, may have critical applications like driverless cars, however, there are always use cases like tracking, energy management, environment monitoring, utility distribution networks etc. that are applicable in almost all business domains and hence should be allowed for all connectivity providers irrespective of the type of spectrum being used to provide connectivity services by them. We are also of the view that the criticality of the M2M applications and services should be use-case driven and the same should not be made applicable for the entire sector / industry. Thus, IoT use cases specific to each industry should be driven by SLA/ QOS / KPI for each IoT solution as adopted by the industry. Mechanism to define KPIs on case-to-case basis to be formalized through a joint working group. For instance, for smart metering, such QoS, latency, SLA, etc. has already been defined by IS standards for licensed and unlicensed bands and is part of a massive all India rollout by the Ministry of Power with about 100 million meters currently being installed[7], of which at least 25% is on unlicensed bands.

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[4] https://www.semtech.com/lora
[5] https://www.semtech.com/lora/lora-applications
[6] https://lora-alliance.org/lorawan-vertical-markets/
[7] https://www.nsgm.gov.in/en/meter-dash

Appendix -3:
Tata Communications comments along with examples for various sector specific critical applications as identified by DoT

S No	Category	Tata Communications Comments
1	Connected Vehicles and Autonomous Cars	Based on the application and use cases, connected vehicles are not always mission critical. Ex - Vehicles in remote areas may not need every 10 second tracking. There are cases where dual technology helps augment the reach where GSM is not available.
2	Remote Surgery	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
3	Trauma & Injury	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
4	Remote Patient Monitoring	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
5	Remote Diagnostics	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
6	Drug Management	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector Ex- Procurement and Distribution have tracking as their core use cases and LPWAN is suited for such applications.
7	Remote Control in Mining, O&G and Construction Projects	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector Ex - Tracking of assets or workers or environment sensing, or structure sensing devices may be on pillars and bridges for multiple years taking readings at periodic intervals
8	Safety & Surveillance	Need for Indoor safety cannot always be met with GSM / LTE networks. PAN and private networks are more suitable. Backhaul can be on licensed band or other technologies.
9	Defence Networks	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector. Tata Communications is working with various Government organizations for LoRa on Satellites and LoRa enabled solutions for remote areas where LoRa has been identified as best fit technology that can provide longer battery life to sensor, is intrinsically more secure due to frequency hopping and can cover larger distances.

10	Financial Transactions	Remote and Village areas are good use cases where the reach of GSM/LTE network is not sufficient. Redundancy, feedback, and accounting systems ensure correctness.
11	Warning sensors for weather alerts and disaster management	There can be use cases that need constant monitoring for long periods. LPWAN provides better fitment for areas where direct power is not available, and monitoring is required for long periods going up to years.
12	Energy Smart Grids	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
13	Utilities Distribution Networks	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector Billing and Meter reading are examples use cases where LPWAN is a better fit.
14	Distribution networks of inflammable/explosives	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
15	Chemical and Nuclear Industry	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector Ex - Asset Monitoring, Energy Management, and Safety use cases are well served with private networks inside premises.
16	Food Industry including smart cultivation, Storage and Public Distribution Systems	Agriculture and Cultivation need sensing at low cost and long periods. LPWAN is best fit for soil monitoring, crop monitoring uses cases where low costs and low energy requirements are key concerns
17	Aviation – Radar Systems	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
18	Drone Communication	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector
19	Space and Research	LPWANS are best suited for Satellite communication. Government research organizations are considering LoRaWAN.
20	Control Network of Smart Cities	Criticality should be use-case driven and the same should not be made applicable for the entire domain / sector Ex- Maximum use cases in smart cities like Smart Lights, Smart Parking etc. are not mission critical and hence should fall under critical applications. They are well served by LPWAN technologies with high KPIs.