RJIL/TRAI/2016-17/1439
14th January 2017

To,

Shri Sanjeev Banzal,
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India,
Mahanagar Doorsanchar Bhawan,
Jawaharlal Nehru Marg,
New Delhi - 110002

Subject: Comments on TRAI's Consultation Paper on 'Spectrum, Roaming and QoS related Requirements in Machine-to-Machine (M2M) Communications' (Consultation Paper No. 21/2016 dated 18th October 2016)

Dear Sir,

Please find attached comments of Reliance Jio Infocomm Limited on the issues raised in the Consultation Paper on 'Spectrum, Roaming and QoS related Requirements in Machine-to-Machine (M2M) Communications' (Consultation Paper No. 21/2016 dated 18th October 2016).

Thanking You,

Yours sincerely,
For **Reliance Jio Infocomm Limited,**

Kapoor Singh Guliani
Authorised Signatory

Encl.: As above.

RELIANCE JIO INFOCOMM COMMENTS ON TRAI'S CONSULTATION PAPER ON 'SPECTRUM, ROAMING AND QOS RELATED REQUIREMENTS IN MACHINE-TO-MACHINE (M2M) COMMUNICATIONS'
(Consultation Paper No. 21/2016 Dated 18th October 2016)

General Comments:

1. At the outset, we thank the Authority for issuing this consultation paper to discuss and finalize the three critical aspects of Machine to Machine (M2M) communications viz. Quality of Service in M2M Services, M2M Roaming Requirements and M2M Spectrum Requirements on the reference of Department of Telecommunications.

2. We also appreciate the fact that the Authority, while acknowledging the potential and growth of M2M service has sought to hold a consultation on all related aspects to the M2M communication services including Licensing, authorization etc. besides the reference by DoT.

3. All the global analysts and experts are unanimous in their view that M2M communications or Internet of Things (IoT) is one of the fastest growing markets with much faster growth in terms of both connections and revenues than the mobile communications market as a whole. Analysys Mason in its *'M2M device connections and revenue: worldwide forecast 2013–2023'*[1] predicted exponential growth in M2M device connections worldwide covering all sectors including Retail, Financial services, Industrial, Government, Healthcare, Automotive and transport, Security, Utilities etc. Their predictions for emerging Asia-Pacific market is reproduced below.

Figure 15: M2M device connections by sector, Emerging Asia–Pacific, 2013–2023 [Source: Analysys Mason, 2013]

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[1] http://www.analysysmason.com/M2M-2013
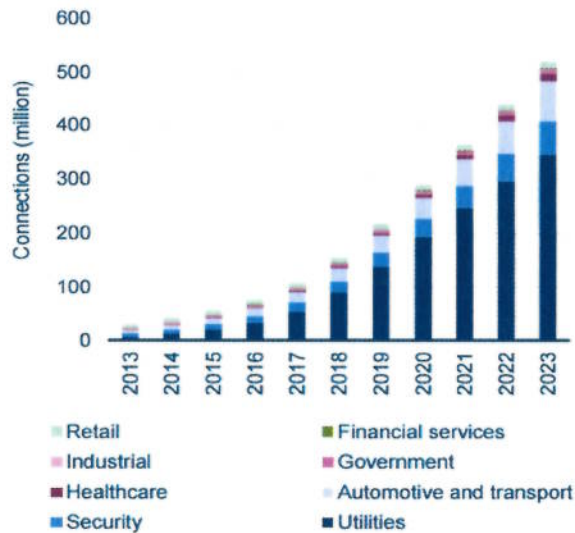
Deloitte has projected that global M2M connections will continue growing at a CAGR of 23% till the year 2022.

Global M2M Connections 2012-2022

4. The overwhelming sentiment on the growth of M2M services and the continued development of the M2M communication applications from basic vehicle tracking systems and remote device monitoring systems in the beginning to the all-pervasive devices that can affect each and every aspect of the human life has led most of the international regulators to devise new rules and regulations for this mode of communication or update the existing regulations which were primarily devised for voice communications.

5. As noted by the Authority substantial work has been undertaken in this regard by many regulators including the European Commission, French, Australian and Colombian regulators among others. The approaches have ranged from looking at all aspects of communication regulation threadbare to analysing the need for change in the existing regulations.

6. The general consensus emerging in the views of Regulators is that barring a few aspects the existing regulatory frameworks will suffice for M2M communications. For instance, the Body of European Regulators (BEREC) report[2] dated February 2016 on *'Enabling the Internet of Things'* mentions that, in general, no special treatment of IoT services and M2M communication is necessary, except for roaming, switching, and number portability.

7. Globally, the primary areas of deliberations undertaken by regulators around the possibility of large-scale use of M2M services are discussed below.

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[2] http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5755-berec-report-on-enabling-the-internet-of-things

a. Privacy and security related issues

The math in this is simple, more the connected devices, more the information potentially available and more the risks to privacy and individual security. M2M devices can record a variety of personal details, like location data, personal and home security details etc and therefore requisite and enforceable data protection rules are required. Additionally the regulators have to devise these rules in a manner that these do not start impacting the new business models adversely.

In India, we already have sufficiently strict and modern regulatory oversight under the license agreement and the Information Technology (IT) Act, 2000 and IT (Amendment) Act, 2008 to address these issues.

b. Roaming

There will always remain a possibility of the M2M devices having SIM cards belonging to different service area and even different country, thereby leading to situation of M2M device being a permanent roamer. These roaming costs are also a basic operational expense that raises the price of a service without creating extra value for the serving network provider. The Regulator must encourage move towards IP based networks and interconnection arrangements as the roaming related issues become substantially less relevant in such networks. The roaming requirements could then be gradually done away with.

c. Spectrum policy

There is a discussion around having dedicated spectrum bands for M2M communications. The issue behind this is the possibility of non-compatibility of the devices with changing technologies. This poses a challenge when some consumer electronics may be operational 10 years after they are purchased and long life products like smart meters that are expected to work for 30 years. However on the flipside there are long term implications of binding a spectrum band to a technology.

India has already moved to technology neutral spectrum post liberalisation and therefore this issue is not relevant. The Authority's approach that any spectrum could be used for any purpose post liberalisation is the most appropriate and commercially most feasible. The modern devices/SIMs are built to support the latest mobile technology with backward integration for the older technologies.

Additionally, allocating separate spectrum bands for M2M communications will be limiting the optimum utilization of this scarce resource. For instance CDMA450 has been used in the Netherlands and Portugal for M2M; however in case the

authorities link this band specifically to M2M then this could be bound of more than 30 years on this particular spectrum, with ever evolving technology, who knows the future dividends of this spectrum.

Therefore the wiser council has been to keep the spectrum liberalized and utilize it for whatever applications/services are most suitable and let market forces decide the optimum use of a spectrum band.

d. Telephone numbering and addresses

The sheer volume of the M2M devices has implications on the already stretched numbering resources in most countries. However, additionally, we may note that as with a few exceptions, M2M services are data services, they do not really need telephone numbers and these can very well have IP address. However the existing constraints on the IP addresses with IPv4 addresses being a scarce resource and uneven movement globally towards IPv6 implies that the best option remains a telephone number.

The various options suggested by *Electronic Communications Committee*[3] (EEC) report on numbering and addressing in M2M dated November 2010 are:

Option A: use existing mobile number ranges

Option B: create a new number range for M2M and similar applications (with a maximum number length)

Option C: create an international number range

Option D: use network internal numbers.

Each of these approaches has its pros and cons, and the ECC advised regulators to take into consideration national circumstances. The ECC recommended that regulators should, in cooperation with market players, establish numbering solutions for M2M applications as part of their national numbering plan.

India has already adopted the option B of these by implementing a 13 digit number series, therefore not much needs to be changed in the near term basis.

At the same time, the Authority must simplify the regime of numbering series. As far as possible, the same numbering series should be used as against different numbering series for different applications. It is easier to use, comprehend and is

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[3] http://www.erodocdb.dk/docs/doc98/official/pdf/ECCRep153.pdf

customer friendly to have the same numbering series so that the customer is not required to frequently change.

e. Network security and resilience

The scale and size of M2M communications implies that the networks will face increased pressure with regard to reliability and security. The provision of service with acceptable standards of quality of service and network security implies that the networks will be the most critical aspect that will need an evolved approach at monitoring these high-volume, low-cost devices.

8. We understand from international and Indian experiences that the M2M value chain will primarily include three or four elements. The backbone of the M2M communications will be provided by the Communication service provider; the application/ platform service provider and cloud service provider, also called M2M Service Provider (MSP) would be the second constituent of the M2M communication value chain, with the end-user being the final end of the chain. In between the end-user and the application/ platform service provider, there can be an additional layer of M2M user or M2M Bulk user. BEREC report on *'Enabling the Internet of Things'* dated 12.01.2016 defines this element as IoT user i.e. Purchaser of an IoT service who incorporates the IoT service as one component in his own products (i.e. connected devices) and/or services (e.g. a car manufacturer, an electricity provider which also includes the provision of a smart meter in its service).

9. Of the above mentioned constituents of the M2M value chain, the most critical role in enabling the M2M services will be played by the Communication service provider. As most of the M2M communications will be over data only devices, the primary network requirement will be of data services only. In India, this comes under the scope of access services and Internet services authorizations, as defined in the Unified Licence issued under the section 4 of Telegraph Act 1885. We submit that under the Act, this role can only be played by a Unified License holder with access services authorization or Internet services authorization.

10. The application services/ M2M platform provider or the M2M Service provider (MSP) will be the technical experts that offer these services on standalone basis or in association with the communication services providers. These service providers are unlicensed entities like the OTT service providers and should be brought under the licensing regime. These service providers may be permitted to offer their services only in association with a Unified License holder with Access/Internet services/ Virtual Network Operator authorization. In case the MSPs wish to offer their services on a standalone basis then they may be required to obtain the Unified License authorization under either Access/ Internet/ Virtual Network Operator service authorization or under a new chapter on M2M services under the Unified License. .

11. The end-user will be the customer who uses the M2M services. There is a requirement to treat this customer at a slightly different level than the normal mobile communication subscriber. The distinction lies in the whole new paradigm of communication setup under the M2M communications. As there is limited possibility of the end-user originated communication the customer verification process can be simplified. Further as the existing instructions on the subscriber verification for bulk users are voice centric, there is a need of suitable changes for M2M communications. As the majority of M2M consumers are expected to be bulk users therefore a simplified process doing away with the onerous requirements like maintaining the record of actual end user can be done away with, as in most cases the end user will be only a machine controlled by a server, specifically in the case of M2M communications provided by the IoT user or M2M Bulk user like a car manufacturer or an electricity provider with smart meter etc., where the M2M service is offered as one of the components in a product offering.

12. Conclusion

1. **The Authority should facilitate the growth of M2M communications in India.**
2. **The M2M communications may be allowed only under the Unified License/ Unified License (Virtual Network Operator) framework. A new chapter in the UL may be introduced on M2M communications to facilitate standalone MSPs.**
3. **There is no need for separate spectrum resources for M2M communications, as sufficient commercial spectrum is available with the service providers.**
4. **The KYC norms for M2M communications users need to be simplified.**
5. **The Authority should facilitate permanent roaming and international roaming without getting into commercial arrangements, which may be left to the market forces.**

Our issue wise responses are detailed below.

Q1. What should be the framework for introduction of M2M Service providers in the sector? Should it be through amendment in the existing licenses of access service/ISP license and/or Licensing authorization in the existing Unified License and UL (VNO) license or it should be kept under OSP Category registration? Please provide rationale to your response.

RJIL Response:

1. We submit that the M2M communication services already exist in Indian market be it in the form of vehicle tracking systems or the smart meters, fitness devices etc. We understand the question is more on facilitating and enabling the M2M communications. As discussed in our general comments, of the three essential components of the M2M value chain, only one is a licensed entity, i.e. the communications service provider holding the appropriate authorization (Access Services/ Internet Service/ Virtual Network Operator). This entity should not require any other license to operate end to end M2M services.

2. Further, as the M2M service provider offering cloud, application/ platform (common service layer) plays important roles in M2M communications, as it communicates, stores, and processes vital information, it should not be left out of the regulatory oversight. Thus the MSP entities providing standalone M2M cloud platform and/or application services in public domain, should be brought under the licensing regime by introducing a new chapter on M2M service providers under the Unified License. All entities desirous of offering M2M services but not holding Access Services/ Internet Services/ VNO authorization, should obtain appropriate licensing authorization under UL to become M2M service provider, which can be either of Access Services, Internet Services, VNO or M2M services.

3. We submit that any entity that wishes to provide M2M services may be allowed to offer the services only post acquiring the Access Services/ Internet Services/ VNO/ M2M services authorization under the Unified License. This will ensure that the existing security obligations under the license will be complied with and there are minimal chances of security breach. This will also ensure a level playing field. Additionally the standalone M2M service provider entities may be allowed to offer the services under a commercial arrangement with existing Access/ Internet Service providers.

Q2. In case a licensing framework for MSP is proposed, what should be the Entry Fee, Performance Bank Guarantee (if any) or Financial Bank Guarantee etc? Please provide detailed justification.

RJIL Response:

1. As already submitted, M2M service should be permitted under the Unified License with Access/ Internet Services authorizations or Unified Licence (Virtual Network Operator).

Therefore the Entry Fee, Minimum Net worth and Minimum Equity requirements for the new MSP authorization should be the same as applicable under such Licenses.

Q3. Do you propose any other regulatory framework for M2M other than the options mentioned above? If yes, provide detailed input on your proposal.

RJIL Response:

1. As mentioned in the above question, M2M services can be allowed under the existing Access/ Internet Service authorization of the Unified License or Unified Licence (Virtual Network Operator). In addition, we suggest that a chapter be included for authorization for M2M services under UL to cover IoT cloud platform operator and application provider. Access/ Internet Service/ VNO authorization licensee should have right to provide IoT cloud platform services without additional authorization.

Q4. In your opinion what should be the quantum of spectrum required to meet the M2M communications requirement, keeping a horizon of 10-15 years? Please justify your answer

RJIL Response:

1. We submit that India is currently following a liberalized spectrum regime, where all commercially viable licensed spectrum is auctioned. Post that the spectrum is deployed for the most suitable services and technology. Therefore as such there is no requirement of defining a quantum of spectrum for M2M communications. The spectrum is liberalized, and the market is open, therefore we should let the market forces decide, instead of regulating the same. Further, with the current prevailing 3GPP technologies it is possible to share the spectrum between narrowband and broadband services. So there is no need to define separate spectrum specifically for M2M. LPWAN network must use only licensed spectrum for quality of service.

2. Most M2M sensor applications require extremely low-cost devices with long battery life, wide area communications range and low cost network platforms. To help support these devices and applications, the Authority should make available all bands identified for IMT and licensed M2M operations through auction process. As licensed spectrum has the capacity and coverage capabilities to support rapid IOT growth, the spectrum should be allotted only to licence service providers.

3. Any allocation of spectrum is useful only if there is an International Harmonization to reap the benefits from economies of scale. The Authority should make available suitable spectrum for M2M services but within the same framework of auction based allocation to licensed operators.

Q5. Which spectrum bands are more suitable for M2M communication in India including those from the table 2.3 above? Which of these bands can be made delicensed?

RJIL Response:

1. M2M covers various Industry verticals and uses different frequencies for various kinds of service offerings covering short range communication on high frequencies like Bluetooth, ZigBee, and 6LoWPAN to low frequency range for RF mesh etc. in neighbourhood network connectivity requirements.

2. For M2M services using public networks, any frequency band harmonised for terrestrial systems capable of providing electronic communication services can be used. However, moving in line with spirit of technology neutral spectrum regime, we believe, no separate spectrum should be earmarked for M2M services.

Q6. Can a portion of 10 MHz centre gap between uplink and down link of the 700 MHz band (FDD) be used for M2M communications as delicensed band for short range applications with some defined parameters? If so, what quantum? Justify your answer with technical feasibility, keeping in mind the interference issues.

RJIL Response:

1. 700 IMT band is most useful band for mobile communications as recognised in India and internationally. Therefore it will not be prudent to carve out this band for M2M communications, without ever realising its full commercial potential.

2. Further, to prevent signal pilferage and mitigate self- band interference, the 10MHz gap between the uplink and downlink of the 700 MHz band is important and should not be de-licensed. In the absence of any interference studies for this gap band, any decision to de-license this band would be pre-mature.

3. In view of this we submit that there should not be any allocation or de-licensing in 10 MHz centre gap in 700 MHz band.

Q7. In your opinion should national roaming for M2M/IoT devices be free?
   (a) If yes, what could be its possible implications?
   (b) If no, what should be the ceiling tariffs for national roaming for M2M communication?

RJIL Response:

1. Barring a few exceptions, most of the M2M communications is over data services. In India, most of the service providers do not charge roaming charges for data services. Therefore,

in effect the roaming for M2M services is already free, however we submit that there is no need for regulating the same.

2. Machina research estimates that currently there are 350 million cellular based IoT connections worldwide, and this will grow to 1.3 billion over the next five years. The proportion of M2M connections accounted for by roaming is growing even at faster rate. The rate of growth is such that it is entirely possible that there will be as many machines as people roaming by 2020. As these devices will spread over the networks and geographical boundaries, the market forces will take care of the roaming arrangements.

3. In view of that, we submit that national roaming for M2M/ IoT devices should be on the basis of the commercial arrangements made by the licensees with other licensees/ M2M provider as allowed in the current licensing regime. The roaming agreements should be entered by the licensees according to the present terms and conditions mentioned in the Unified License, and decision to charge or free up the national roaming should be the choice of the respective service providers.

Q8. In case of M2M devices, should;
   a. roaming on permanent basis be allowed for foreign SIM/eUICC; or
   b. Only domestic manufactured SIM/eUICC be allowed? and/or
   c. there be a timeline/lifecycle of foreign SIMs to be converted into Indian SIMs/eUICC?
   d. any other option is available?
Please explain implications and issues involved in all the above scenarios.

RJIL Response:

1. The big growth potential of M2M businesses is beyond doubt as indicated in the various market researches. M2M has the potential to not only transform business for enterprises by bringing in efficiencies but can also touch millions of life through benefits derived through useful applications for medical diagnosis and treatment, cleaner water supply, improved irrigation, energy conservation etc.

2. In case of M2M devices, permanent roaming should be allowed. The M2M device manufacturers should enter into commercial/ roaming agreements with the Indian TSPs. The service providers will get the SIMs issued after fulfilling KYC requisite in case of corporate connections and individual connections.

3. There should be no breach of security, privacy or data protection. The usage of Indian SIMs or foreign SIMs in M2M devices may be allowed keeping the above fact in mind.

4. Devices which are manufactured in India may be equipped with Indian SIMs. However, the devices which are imported from foreign country may be allowed to be equipped with embedded or soft SIMs which can update TSP profile or IMSI.

5. Further, as most of the M2M services will require data connectivity so actually there is no need for any MSISDN and associated number portability requirement.

Q9. In case permanent roaming of M2M devices having inbuilt foreign SIM is allowed, should the international roaming charges be defined by the Regulator or it should be left to the mutual agreement between the roaming partners?

RJIL Response:

1. The demand and growth will be driven by global manufacturers with mobile connected devices that travel in multiple countries. With the current network infrastructure, it is much simpler to roam on the network than provisions every SIM depending on where it will operate.

2. Permanent roaming enables M2M devices to obtain better coverage in a 'visited' country – which would not be available to a purely local SIM in the absence of extensive agreements for international roaming.

3. In case permanent roaming of inbuilt foreign SIM is allowed it should be left to the mutual agreement between the roaming partners. A commercial contract between the enterprise customer and the network operator should be there with well-defined SLA by the home network. Establishment of alliances between partners should not be governed by regulator.

Q10. What should be the International roaming policy for machines which can communicate in the M2M ecosystem? Provide detailed answer giving justifications.

RJIL Response:

1. M2M services in future may become very pervasive which will make certain M2M services such as healthcare monitoring, intelligent driving system in automobiles, etc extremely critical. The global nature of M2M requires international alliances to be developed between the main mobile operators across countries.

2. The machines manufactured outside India could use embedded or soft SIMs or any similar technology which can update TSP profile or IMSI over the air.

3. Another option could be a partnership between machine manufacturer and Indian TSPs equipping Indian SIMs. The commercial arrangements between the parties should not be

regulated by the regulator. However, the government should permit the devices on the criteria of proper traceability.

Q11. In order to provide operational and roaming flexibility to MSPs, would it be feasible to allocate separate MNCs to MSPs? What could be the pros and cons of such arrangement?

RJIL Response:

1. A M2M service provider or an M2M Bulk user will have to procure SIM or bandwidth from a telecommunication service provider. Both the parties have to mutually get into an agreement. As MNC's are already allocated to TSP hence there would be no need to provide separate MNCs to MSPs.

Q12. Will the existing measures taken for security of networks and data be adequate for security in M2M context too? Please suggest additional measures, if any, for security of networks and data for M2M communication.

RJIL Response:

1. For providing M2M services by the TSP's over cellular networks, there is no need for any further specifications as the current licensing framework under which TSPs' operate already covers security specifications. Besides the existing security requirements under the Unified License, the Authority should mandate that the MSP, i.e. the M2M cloud platform and application providers have their servers located in India and that the MSPs abide by necessary licensing and IT act terms for delivering M2M services. By requiring them to host in India it will be possible to address the unforeseen security challenges. In this regard also, it is important that a licensing regime be imposed for MSPs, ideally on the lines of the Unified License.

2. Massively deployed M2M systems are promoted as the next "big thing" for the telecommunication world. As it grows, M2M connections would have various service restrictions to prevent misuse over the Cellular networks i.e. they can only communicate with only the pre-defined number (circuit switched call or SMS) or to a specific server with a fixed APN only etc.

3. Newer technologies like LTE are adopting stricter security mechanisms by providing sufficient security to control and data traffic. Hence, the additional security requirements discussed in the previous paragraph should suffice but should be made mandatory for all M2M services.

Q13. (a) How should the M2M Service providers ensure protection of consumer interest and data privacy of the consumer? Can the issue be dealt in the framework of existing laws? (b) If not, what changes are proposed in Information Technology Act 2000 and relevant license conditions to protect the security and privacy of an individual?

RJIL Response:

1. Considering the significant proliferation of M2M services in health, transport, electronics, power and energy and essentially every other sector, a large amount of information will be generated, transmitted and collated. Data privacy and security for both individuals and enterprises would be a major concern. The existing telecom guidelines ensures the protection of consumer and data privacy. Further, the mandatory requirement for the MSPs to maintain their servers in India will buttress the same. In view of that there is no need to make any more addition/ modification to the existing laws to ensure protection of consumer interest and data privacy.

2. In India, Information Technology (IT) Act, 2000 and IT (Amendment) Act, 2008 governs the data services. In addition to the Acts, there are general security requirements mentioned in the document by TEC of DoT which are applicable to M2M networks. These current requirements would be sufficient to address the data privacy and security issues.

Q14. Is there a need to define different types of SLAs at point of interconnects at various layers of Heterogeneous Networks (HetNets)? What parameters must be considered for defining such SLAs? Please give your comments with justifications.

RJIL Response:

1. Internet of Things (IoT) is a technological paradigm which is an extension of existing heterogeneous networks with capabilities of sensing, actuation, communication, computation, networking and storage to get the real world data to the end user applications and systems. Quality of Service (QoS) in IoT is one of the critical factor for implementation, management and optimizations.

2. Licensed spectrum can reliably deliver high quality of M2M services over wide areas, as operators are not at risk of interference and can control usage levels. QoS parameters are covered in the license of the TSP's, and the same can be extended to M2M services as well.

Q15. What should be the distributed optimal duty cycle to optimise the energy efficiency, end-to-end delay and transmission reliability in a M2M network?

RJIL Response:

1. A service in IoT can be defined by the combination of capabilities of 'functionalities, interoperability, interactions, communication abilities, related data and ability of using the related data' of device(s) for implementing the IoT system to meet the requirements of specific application(s) and end user system(s). QoS parameters are key factors for evaluating if technologies, services, and applications meet customer expectations for quality, availability, and reliability.

2. The regular QoS benchmarks for TSP's are well-defined and sufficient for IOT environment. Hence there is no need for any new additional QoS requirements. Commercial considerations will also help in ensuring that QoS benchmarks are met.