GSMA comments to the BEREC's open consultation on IoT indicators

January 2019

The GSMA, which represents the interests of mobile operators worldwide, hereby would like to provide its comments to BEREC on its open consultation on Internet of things (IoT) indicators. We hope the following comments can serve as a constructive contribution to BEREC's work in the preparation of the final report, expected at BEREC's plenary meeting in March 2019.

1. General issues

Question 1.1. Do you consider that the European Commission's[1] definition of the IoT is sufficiently appropriate to collect relevant statistical information on the IoT? If not, how should the definition be changed?

- The GSMA believes that other definitions, such as the one proposed by OECD or the GSMA would be more helpful in providing indications on how to collect relevant statistical information on the IoT. The European Commission's definition of the IoT of 2015 does not capture accurately the recent developments of IoT applications, such as inclusion of limited human interaction.
- In its recent paper, the OECD reported a possibly more useful definition: "*The Internet of Things includes all devices and objects whose state can be altered via the Internet, with or without the active involvement of individuals. While connected objects may require the involvement of devices considered part of the "traditional Internet", this definition excludes laptops, tablets and smartphones already accounted for in current OECD broadband metrics.*"[2]
- In its response to BEREC's 2016 consultation 'Enabling the IoT' the GSMA made the following points:

"*The GSMA agrees with BEREC that "M2M services are in varying phases of development and take various shapes, hence there is not yet a common understanding or definition of what M2M services and devices really are. For the purposes of this report, it is not necessary to determine in a detailed manner which definition is most appropriate."*

The GSMA recognizes that in the existing literature, a number of definitions for M2M and IoT exists and by no means there is industry agreement on these terms definitions. However, coherently with our previous communications to BEREC in this document, we use the following definitions:

Internet of Things (IoT): *Coordination of multiple vendor machines, devices and appliances connected to the Internet through multiple networks. Devices include everyday 'objects' such as smartphones, tablets and consumer electronics, such as machines, vehicles, monitors and sensors equipped to support M2M services.*

(…)

Machine to Machine (M2M): *Devices and appliances connected wirelessly or via IP. In most cases, communication takes place autonomously, with limited human intervention. M2M is an integral part of the IoT."*

Finally, in line with new EECC, we would suggest that the M2M/ IoT definition should acknowledge the limited voice/SMS communication as an ancillary feature to the IoT main service proposition. [3]

[1] European Commission defined the IoT as enabling "*objects sharing information with other objects/members in the network, recognizing events and changes so to react autonomously in an appropriate manner. The IoT therefore builds on communication between things (machines, buildings, cars, animals, etc.) that leads to action and value creation*."

[2] OECD (2018) –IoT measurement and applications

[3] EECC, article 2 (definitions) paragraph acknowledges [interpersonal and interactive communication as a minor ancillary feature that is intrinsically linked to another service]

Question 1.2:
Please suggest any available sources for information on measures/indicators of the IoT, in addition to the information mentioned above.

- The GSMA intelligence elaborates figures for total licensed cellular IoT by type (cellular M2M and Licensed LPWA) and estimates that by 2025 there will be 25.2 billion connections globally, out of which "only" 3.1 billion will be cellular (cellular M2M and licensed LPWA)[4]
- The OECD *IOT Measurement and applications Report,* of October 2018 provides a good overview of the IoT ecosystem and market structure;
- From all these sources and figures, it is clear that cellular connections are only a small but important part of total IoT connections universe.

[4] GSMA Intelligence (2018) - GSMA intelligences estimates cellular connections based on:"*A unique SIM card registered on the mobile network at the end of the period, enabling mobile data transmission between two or more machines. It* ***excludes computing devices in consumer electronics such as e-readers, smartphones, dongles and tablets****."*

2. BEREC's IoT Universe

Question 2.1:

Do you agree with the multi-layered approach in Figure 2 above, which seeks to separate M2M/IoT from the underlying connectivity and shows the relationship to ECS?

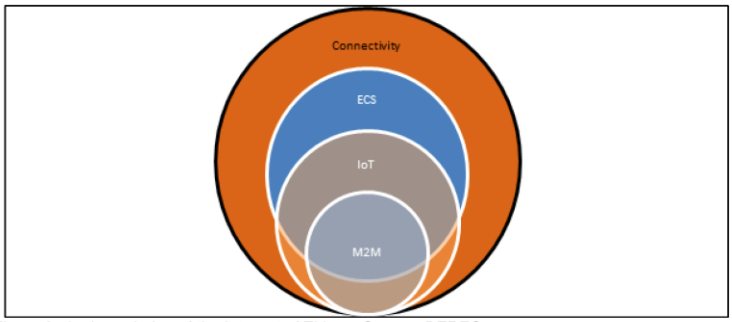

Figure 2: the boundaries of the Internet of Things. Source: BEREC.

- As BEREC recognizes, IoT connectivity can certainly be provided beyond traditional ECS services including commercial networks in unlicensed solutions spectrum (Sigfox etc.) or private networks as defined by BEREC (for example WiFI, Bluetooth, Zigbee).

- Still, the GSMA believes that Figure 2 in the BEREC consultation document does not necessarily capture and communicate the fundamentally different nature, complexity and variety of potential IoT connectivity architectures. These often combine short range unlicensed and Wide Area Connectivity solutions for many devices for the same service. (e.g. Smart home, Connected Car), and this complexity is not represented.

- The figure places ECS at the centre, suggesting a telco-centric view, which is, in GSMA view, not reflective of the true nature of IoT. If there is to be a Figure 2, then the connectivity bubble should be split into different types of connectivity that can be provided through various networks (licensed, unlicensed spectrum and private networks) and the ECS bubble should be deleted. Alternatively, in consideration that the EECC considers now any type of M2M connectivity to be part of the ECS, unlicensed spectrum and private networks need to be included within the ECS circle.

- Furthermore, to avoid confusion, it should be clearer that the diagram is about the connectivity dimension of IoT only. It should be renamed as '*The boundaries of IoT connectivity*' and the IoT circle should be labelled as '*IoT connectivity*'. This is because the impact of IoT will go far beyond connectivity.

- Our GSMA Intelligence department for example estimates that the overall revenue generated by IoT connectivity will only be between 5.4% to 9,2%[5] with the vast majority of the revenues and economic impact being generated by applications and service providers, or professional services.[6]

- In any case, aside from figure 2, the key point is that BEREC can no longer rely on traditional telco providers data, but needs to expand their data collection exercise onto 'adjacent' markets and players.

[5] GSMA intelligence (2018)

[6] The GSMA is planning to develop further research in this area by March 2019 including an estimation of the productivity, GDP and taxation impact of IoT.

- Unlicensed LPWA will play an important role in IoT. As such, BEREC and European NRAs should focus their efforts in understanding this part of the market, to ensure a level playing field across the various connectivity options.
- The GSMA believes it is important to establish and apply a technology and service-neutral framework for IoT connectivity. When deciding on their connectivity solutions, IoT service providers should make a choice based on the characteristics of the service they are planning to offer and its end-users needs. The ultimate choice will depend on a number of factors, such as the scale and geographical footprint of the deployment, the type of IoT application, the device lifetime, its accessibility and bandwidth requirements. BEREC should recognize the fundamentally different nature of IoT from traditional voice and data services and support a policy framework based on equal services and technological neutrality.

Question 2.2:

What is your opinion on the differentiation of IoT and M2M? Do you have any additional proposals regarding such differentiation?

- The GSMA believes that it is best to measure IoT connections without differentiating from M2M.
- The GSMA notes that BEREC's M2M definition[7] emphasizes the '*lack of human intervention*'. Instead, the GSMA definition more generically refers to '*limited human intervention*'[8]. The latter being in line with Directive 2018/1972, which also indicates that M2M services can consist of "*limited or no human interaction*"[9]. Proposing a differentiation purely based on BEREC's definition would therefore be at odds with the wording of the same Directive.
- In addition to that, the GSMA believes that a differentiation between IoT and M2M may be complex to implement in practice and generate confusion. While it is clear that the term 'machine-to-machine' indeed aims at capturing the communication exchanges happening between machines, it may be complicated to quantify or estimate M2M devices and services as a sub-set of IoT and classify them based on their level of human intervention.
- It would pose the problem of defining what exactly 'human intervention' means[10]. Would for example punching a code on M2M-connected POS[11], or controlling the functionality of a smart meter via a phone-based App considered human intervention?

[7] As reported in the consultation and by BEREC report on convergent services (2010)

[8] GSMA response to BEREC 2016: M2M: Devices and appliances connected wirelessly or via IP. In most cases, communication takes place autonomously, with limited human intervention. M2M is an integral part of the IoT.

[9] Directive 2018/1972, Recital 249-.

[10] See for example the case of Brazil tax rebates applicable only to M2M with no human intervention: https://techpolis.com/wp-content/uploads/2015/07/How-to-Grow-M2M-in-Brazil-FINAL.pdf . In their final recommendation Techpolis indicates that what human intervention means will increasingly be "further blurred" with

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Question 2.3:

In relation to application solutions, do you see the three categories "Industrial", "Automotive" and "Consumer" as the most relevant? Would you suggest other categories? If so, please elaborate.

GSMA intelligence monitors IoT connections by sectors type. The below table reports estimates for EU 28.

EU - IoT connections (millions)	2018	2025	CAGR
Smart utilities	195	404	11%
Smart vehicles	156	213	5%
Smart manufacturing	33	184	28%
Smart city	35	104	17%
Smart retail	29	65	12%
Health	17	47	16%

Source: GSMA intelligence (2018)

- Nonetheless, the GSMA notes that at this early stage of the industry, there are many relevant categorizations available and there is no common agreement on a standard one. It would be the role of a national statistics office, not a telecom regulator, to define one.
- In addition to that, it is unclear what the need and rationale would be for NRAs and BEREC to collect this information. Request for information represent a cost and an administrative burden for our members, as such any request should be proportionate and assessed against a specific need to be addressed.
- We consider that the proposed sectorial categorisation is not sufficiently relevant from a regulatory perspective. We suggest considering, as of relevance for future regulatory considerations, the categorisation based on enabling connectivity technologies: 1) cellular and 2) non-cellular IoT connectivity technologies (including, fixed, private networks, satellite, etc.). This can help ensure a regulatory level playing between cellular and non-cellular technologies;

3. Effect of the IoT on NRAs' spectrum policies and allocation of scarce resources

Question 3.1:

In your opinion, what effects on spectrum policy is the development of the IoT expected to have, and do you think it is necessary for NRAs to monitor, and BEREC to benchmark, these developments?

It is useful for BEREC and European NRAs to gain an understanding of IoT market developments and their impact on spectrum demand. However, BEREC should consider that IoT connectivity architecture varies substantially across different services, and so do bandwidth and latency requirements, with most IoT services today typically consuming low data volumes (e.g. smart meters, smart parking devices, Smart Agri applications) but this may change in the future.

Technology and service neutrality: While keeping track of IoT developments will be useful, it is important that BEREC and European NRAs maintain a spectrum policy that is technology and service neutral to support IoT. It is essential that they provide a regulatory framework for licensed spectrum that facilitates the development and growth of IoT, and does not impose service or technological restrictions that hold back innovation. Operators should not be prevented from deploying the latest cellular IoT technologies in their licensed spectrum bands due to technological restrictions. For example, 3GPP Release 13 cellular standard (NB-IoT and LTE-M) allow GSM and LTE networks to support LPWA IoT applications in almost all licensed mobile bands. This includes the ability to support personal and IoT connectivity in the same frequency band at the same time. The regulatory environment should be designed to nurture this evolution in the capabilities of mobile networks and allow the market to decide which solutions thrive.

Globally harmonised bands: BEREC and European NRAs should also refrain from setting aside or assigning ad hoc spectrum bands for specific IoT services. This is because international spectrum harmonisation is vital for a global, affordable cellular IoT market. Mobile bands that are widely harmonised around the world enable mass market low cost cellular IoT devices by creating a large enough addressable market to support manufacturing economies of scale. Harmonised mobile spectrum is needed to support all wide area IoT use cases including coverage bands for LPWA use cases and capacity bands for high bandwidth applications like video streaming.

Licensed LPWA and 5G: LPWA technologies (NB-IOT and LTE-M) were designed to be supported in most existing cellular bands. In fact one of the key advantages of these technologies is to be able to operate on existing allocated spectrum resources and to easily integrate into existing radio access so to facilitate IoT deployment. NB-IoT and LTE-M are 3GPP standards that are both set to coexist with other 3GPP 5G technologies, fulfilling the long term 5G LPWA requirements. In order to complete the 5G system support for NB-IoT and LTE, 3GPP is also investigating options for the 5G core network to support these NB-IoT and LTE-M technologies. This will enable a smooth operator migration path to 5G NR (New Radio) frequency bands.[12]

[12] Mobile IOT in the 5G future: https://www.gsma.com/iot/wp-content/uploads/2018/05/GSMA-5G-Mobile-IoT.pdf

Question 3.2:
With regard to the expected growth in the use of IoT devices, do you see the necessity for NRAs to monitor, and BEREC to benchmark, these developments, particularly with respect to numbering? If so, why?

- The GSMA does not foresee an immediate problem of scarcity of numbering resources caused by IoT. Only a small part of existing and future connected IoT services will have a dedicated number and the existing E.164 and E.212 resources do not seem scarce in the region.

- There may be specific country circumstances where, due to the configuration of the numbering system, potential situations of scarcity may manifest. However, the problem to our knowledge is not generalized.

- It should be noted that IoT devices may use national, foreign or global numbering resources. We therefore encourage BEREC to support the use of supra-national numbering which does not place any pressure on national numbering resources.

Question 3.3:
Do you see the need for NRAs to monitor which national numbers for IoT devices are used outside their domestic market/territory (and vice-versa, which numbers assigned in other countries are used in the NRA's territory)? If so, please elaborate.

- The GSMA considers sufficient the obligation deriving from the new EECC for BEREC to monitor such use.

Question 3.4:
In your opinion, in addition to NRAs, for which entities (EU and non-EU) are the following individual matters relevant:
(a) The effect of IoT on spectrum policy

(b) The effect of IoT on scarce resources, i.e. numbering

(c) The monitoring of national numbers for IoT devices used on an extraterritorial basis

Sector-specific policymakers are developing regulation that risks excluding usage of cellular IoT standards. We have seen early examples of this in the automotive and drone sectors. We therefore urge BEREC to take a proactive role in monitoring and participating in these IoT spectrum policy discussions to educate vertical legislators and ensure that technology neutrality principle is guaranteed.

5. Other issues

Question 4.1:
What is your opinion on the benefit of a BEREC common approach regarding the IoT?

A common approach is welcome in providing regulatory certainty and in establishing a harmonised regional framework. Our members experience intense and constant challenges during the deployment of enterprise and consumer IoT applications, because of the existing fragmentation, as they navigate through different EU markets and respective variations of regulations' interpretation.

Nonetheless, the GSMA believes that in pursuing this objective BEREC and European NRAs should consider the impact on businesses:

- Any data collection requests of BEREC must be proportionate and genuinely necessary.

- Each information request to a service provider represents an additional administrative burden, multiplied if the provider operates across multiple Member State markets and most respond to the same or similar requests in each jurisdiction. If collection of some data points is determined to be necessary, a common format to be used by all NRAs is recommended as would reduce administrative costs.

What we consider relevant at this stage to inform the regulatory debate and support spectrum efficient allocation is the collection of statistics regarding: 1) IoT applications and devices that operate in licensed vs. unlicensed; and 2) data on cellular and non-cellular IoT devices and respective connectivity technologies.

Question 4.2:
Do you agree with the general areas of interest for future indicators (to be collected), presented in Figure 4 above? Could you suggest any specific IoT indicators that BEREC should consider for collection?

Figure 4 in BEREC consultation proposes an extensive monitoring of many aspects of IoT. It would be important to have an understanding of IoT beyond the connectivity market to put the phenomenon in the right context.

From the consultation document the GSMA understands that at national level there is little interest in expanding the data collection beyond what is already being done, unless BEREC took the role to do it centrally. Also, there is little clarity on what the exact purpose(s) of such collection would be.

As mentioned in 4.1 information requests represent an administrative burden and a cost. If they were to be placed only on a limited number of players in the IoT connectivity value chain, they would be unjustifiable and disproportionate. They would also not be helpful to understand the entire IoT phenomenon.

BEREC expresses uncertainty on the extent to which the new regulatory framework (Directive 2018/1972), allows data collection beyond traditional connectivity providers. In this regard, it should again be mentioned that IoT connectivity is an important but relatively small part of the overall IoT revenue opportunity. As such, a data collection exercise focusing only on a sub-set of connectivity providers would be of little value.

Question 4.3:
Do you support the gathering of statistical information on IoT by BEREC? Please substantiate your answer.

Under Directive 2018/1972 it is unclear whether BEREC remits extends beyond traditional ECN /ECS providers. If data collection was exclusively on these subjects it would only capture a fraction of the IoT connectivity market and as such pointless. Also, the consultation document provides little information about the purpose of such a data collection.

Therefore, it appears to be premature for BEREC to initiate a further data collection exercise beyond what is already taking place at national level. Further substantiation is provided under section 5.

5. Other issues

Question 5.1:
Are there any additional issues relating to collection of statistical information on the IoT which have not been included in previous questions that you would like to address?

- The potential economic impact of IoT is promising to be substantial and far beyond the connectivity market: from improving productivity, to reducing public administration costs in deploying public services, monitoring and reducing pollution, to improving and facilitating the delivery of public services.
- While BEREC responsibilities and powers lie exclusively within the remit of electronic communications, it is important that, beyond BEREC and European NRAs, official government statistic departments capture the overall IoT phenomenon and measure its economic impact on society. This is at macro level, beyond electronic communications.
- Overall estimates of the economic impact of IoT, beyond the pure IoT connectivity dimension, are in our view necessary at national and regional level to inform better, evidence-based policy making.