

Mobile Network (SIM) Based IoT Numbering Plan of Bhutan



**BHUTAN INFOCOMM AND MEDIA AUTHORITY
ROYAL GOVERNMENT OF BHUTAN THIMPHU, BHUTAN**

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1. Background

The International Telecommunication Union (ITU) has defined Internet of Things (IoT) as “Global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies”.

The IoT applications and its implementation is significantly taking place around the world. For instance, the number of IoT devices worldwide is expected to be tripled from 9.7 billion in 2020 to 29 billion in 2030. As of 2021, there are 11.3 billion IoT connected devices. Majority of the IoT devices are being used in fields of electricity, gas, steam & A/C, water supply & waste management, retail & wholesale, transportation & storage, and government.

Similarly, the IoT applications are also gradually being implemented in Bhutan. It is definite that Bhutan will see an increase in usage of IoT applications with time. IoT development can benefit all sectors including agriculture, utility companies, transportation and logistics, energy, telecom, healthcare, finance, remote monitoring, manufacturing and industries, safety and security and other vertical sectors.

Currently, the conventional subscribers’ number format allotted to the Bhutan Telecom Limited (BTL) is **17xxxxxx** and Tashi InfoComm Limited (TICL) is **77xxxxxx**. It is critical that the conventional subscribers’ numbers are not mixed and used with the IoT devices applications. Since the current National Numbering Plan of Bhutan does not accommodate the mobile network (SIM) based IoT numbering plan, it is important for a conducive National Numbering Plan accommodating emerging technologies such as IoT applications.

Due to the potential of a high proliferation of Machine-to-Machine (M2M) and IoT connectivity services and other non-interpersonal communications services, the Bhutan Information Communication and Media Authority (Authority) has identified the need to amend the current National Numbering Plan of Bhutan which came into force in 2018 and developed a separate numbering format for the IoT applications to be used in SIM based IoT services. This will help in drawing out the clear distinction between the SIMs used for conventional mobile subscribers and the SIM based IoT application.

2. Legal Basis

This Regulatory framework is issued by the Authority in accordance with the Information, Communications and Media Act of Bhutan 2018 to regulate the allocation and assignment of numbers for Mobile Network (SIM) based IoT deployment in the country.



3. Title and Commencement

This Regulatory framework shall be called the “Mobile Network (SIM) Based IoT Numbering Plan of Bhutan” and shall come into force on the 21st of February 2023 corresponding to the first day of the first month of the Water Female Rabbit Year.

4. Scope of Application

This Regulatory framework shall apply to all the Network Service Provider and the IoT Service Providers who use the number resources for any SIM based IoT deployment within the kingdom of Bhutan.

5. Addendum

This Regulatory framework shall be an addendum to the National Numbering Plan of Bhutan 2018.

6. Objectives

This Regulatory framework is issued with an objective to provide clarity on the required processes for allocation of numbers for any SIM based IoT deployment and to;

- a. Ensure an efficient and effective management and utilization of number resources,
- b. Establish an effective national numbering framework for SIM based IoT deployment in compliance with recognized international standards,
- c. Ensure the continuous availability of numbers for SIM based IoT devices and enable the users to use the allocated numbers responsibly,
- d. Promote and establish a transparent and equitable system in the allocation of numbers.

7. Amendments

This Regulatory framework is subject to amendment and changes in accordance with the needs and changes in national priorities, numbering resources, Government policies and industrial and technological trends. Amendment of this Regulatory framework by way of addition, variation or repeal may be affected by the Authority as and when required.

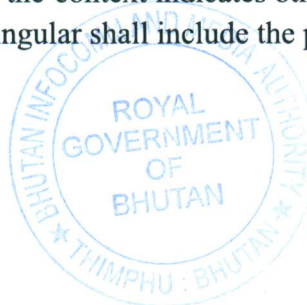
8. Interpretation

The power to interpret this Regulatory framework shall vest with the Authority who may issue such instructions as may be necessary to give effect to and implement the provisions of this Regulatory framework.

9. Rules of Construction

In this Regulatory framework, unless the context indicates otherwise, the masculine gender shall include the feminine gender and the singular shall include the plural and vice versa.

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10. Definitions

Authority means the Bhutan InfoComm and Media Authority established as per the provisions of the Information, Communications and Media Act of Bhutan 2018.

Conventional Services are regular cellular network services which allow the person to person voice and data communication in a telecom network.

GovTech Agency is an autonomous agency under the governance cluster to drive digital transformation by using technology to enhance the effectiveness and efficiency of the government, transform public services to be citizen-centric, and create a safe and thriving Bhutanese digital economy, according to a press release from the agency.

International Telecommunication Union (ITU) is a specialized agency of the United Nations responsible for many matters related to information and communication technologies.

Internet of Things (IoT) is the interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data.

IoT Service Provider IoT Service Providers are a company/organization that provides, operates and facilitates the deployment of Internet of Things using the network provided by Network Service Providers. If the Utility Companies such as Transport, Electricity etc use/provide IoT services applications, the Utility companies shall be considered as the IoT Service providers.

Machine to Machine (M2M) is the direct communication between devices using any communications channel, including wired and wireless.

National Numbering Plan is the National plan which has been formulated for highlighting the conditions of use, allocation procedures and the flexibility to reserve and release the additional numbers as per the need.

Network Service Provider Network Service Providers are a company/organization that provides, operates and sells access to cellular services and Internet backbone infrastructure and services to other organizations/individuals.

Subscriber Identity Module (SIM) card is a removable smart card for mobile phones that stores network specific information used to authenticate and identify subscribers on the network.

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11. IoT Numbering Structure

11.1. The SIM based IoT numbering structure/series for Bhutan shall be a 12-digit numbering scheme (excluding country code) as shown in the table below, which will result in the capacity of 10 billion SIM based IoT devices for each operator's network in Bhutan.

11.2. This numbering scheme is unlike the conventional subscribers 8 digit numbering allocation which otherwise would provide capacity of only 1 million devices.

Country Code (3 digits)	Network Identification Code (2 digits)	M2M Identifier (Application based Code) (2 digits)	Device Number (8 digits)
(975)	<p>“19” for devices using BTL IoT SIMs</p> <p>“79” for devices using TICL IoT SIMs</p>	<p>XX</p> <p>“00” to “99”</p>	<p>YYYYYYYY</p> <p>“00000000” to “99999999”</p>

a. Country Code

The “Country Code” for Bhutan in “975”.

b. Network Identification Code

For the SIM based IoT numbering scheme, the number “19” shall be allocated for BTL and the number “79” shall be allocated to TICL for SIM based numbering in IoT implementation.

c. M2M Identifier (Application Based Code)

The two digits from “00” to “99” shall be used for the M2M Identifier based on the application. It shall be used strictly based on the following applications mentioned in the table below while issuing the IoT SIMs to the users. For instance, if it is for *Smart power metering* using BTL SIM, the M2M Identifier shall be “01”, thus the SIM numbering shall be “975 19 01 YYYYYYYY”

Sectors/Industry Verticals	M2M Identifier (Application Based Code)	IoT Applications
Automotive/Transportation/Logistics	00	Vehicle tracking, Traffic control, Navigation, Infotainment, Fleet management, Asset tracking, Manufacturing, Logistics, etc.

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Utilities/Energy	01	Smart power metering, Smart grid, Electric line monitoring, Smart water metering, pipeline monitoring, etc.
Telecom	02	Data storage and management, Asset monitoring
Healthcare	03	e-health, Remote diagnostics, Medication reminders, Tele-medicine, wearable health devices, etc.
Financial/ Retail	04	Point of sale (POS), ATM, Vending machines, Digital signage, and Handheld terminals, etc.
Public Safety	05	Highway, Bridge, Traffic management, Homeland security, Police, Fire, and Emergency services, Fire alarm, home security monitoring etc.
Smart City	06	Intelligent transport System, Intelligent waste management, Street Light control system, Water distribution, Smart Parking, etc.
Agriculture	07	Farm management and real time farm monitoring etc,
Others	<p>The operators shall use additional M2M identifiers if not mentioned in above. However, before the operator uses the new M2M Identifier Code, the operator has to consult the Authority.</p> <p>Once one of the operators is allowed to use additional M2M Identifiers, the same M2M Identifier code has to be used by the other operator for same/similar services.</p>

12. Obligations for Network Service Providers

12.1, The implementation of SIM based IoT by network service providers like mobile network operators does not need a separate license as it shall be under the scope of the ICT Facility and Service license. However, if the network service provider is not the mobile network operator, a separate license is required.



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12.2. The network service provider shall ensure that the implementation of any sort of IoT in which the network is provided by the network service providers, in the country, shall be as per the Policy Directives issued by the GovTech Agency.

12.3. The network service providers shall abide by any directives and notifications issued by the Authority at any time for the IoT services which use the operator's network.

12.4. The implementation of SIM based IoT by the network service providers shall not affect and compromise the Quality of Service (QoS) of cellular mobile voice and data services in 2G, 3G, 4G and 5G.

12.5. The network service provider shall carry out the trial testing of any SIM based IoT services in the live networks before the implementation and present to the Authority the details of trial testing.

12.6. The network service provider shall strictly abide by the SIM based IoT numbering structure while issuing the IoT SIM numbers to the IoT service providers or to the IoT users.

12.7. The network service providers are required to put in place a proper registration and assignment processes similar to the conventional SIM registration, for IoT based SIM issuance to the IoT service providers and the users.

12.8. The network service providers shall register all SIM cards issued to the IoT service provider/users in Bhutan, maintain a detailed database and provide quarterly updates to the Authority with all details.

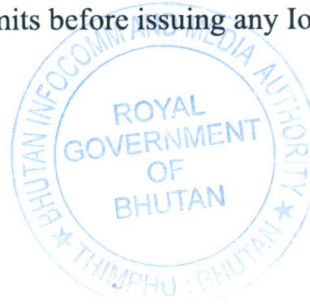
12.9. The network service provider shall ensure that the numbering range provided is exclusively used for IoT SIM cards only and not for conventional SIM cards.

12.10. The network service providers shall ensure that the separate IoT SIM cards different from conventional subscribers SIM is issued for the IoT usage and it shall be used only for automated communication.

12.11. The IoT SIM cards shall not provide any voice services and shall provide only the automated data communications along with automated/bulk SMS features in line with the existing code of practice for Short Messaging Service - Cell Broadcasting Service 2019.

12.12. The network service providers shall inform the IoT service provider/users to apply to the Authority for IoT services implementation license/permits before issuing any IoT SIMs.

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12.13. Any IoT devices with embedded SIM (eSIM) facility in future shall be based on the “Over-The-Air” provision where it can be re-provisioned remotely over-the-air with a new service provider avoiding sole-service provider lock-in. The eSIM in IoT devices should be allowing the “over-the-air” provisioning of an initial operator subscription, and the subsequent change of subscription from one operator to another.

12.14. The network service providers shall provide reliable network Quality of Service (QoS) for any SIM based IoT deployment.

12.15. The network service providers shall implement a separate tariff for IoT network services to the IoT provider/users and shall submit the information to the Authority.

12.16. The network service providers shall share a copy of any agreements drawn with the IoT service providers/users to the Authority.

12.17. The network service providers shall maintain end-to-end network security for the connected devices in their network, and ensure and maintain the privacy of information transmitted over the IoT networks, and it's the network service provider's responsibility to set up a secure network.

12.18. The network service providers shall encourage deploying IoT applications using 5G networks wherever possible.

12.19. The network service provider shall ensure security, data protection, privacy and safety of the general public which may get exposed through the use of IoT networks provided by the network providers,

12.20. Devices with pre-fitted eUICC should be allowed to be imported only if it is able to get reconfigured 'Over-the-air' (OTA) with local subscription. GSMA approved guidelines shall be followed for provisioning of new profiles remotely with 'Over-the-air' (OTA) mechanism.

13.Obligations for IoT Service Providers

13.1. The implementation of SIM based IoT by any IoT service providers (e.g. utility companies) shall apply for a IoT service provider license from the Authority and it shall be under the scope of ICT service license.

13.2. The IoT service provider shall ensure that the implementation of any sort of IoT services in the country shall be as per the Policy Directives issued by the GovTech Agency.

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13.3. The IoT service providers shall abide by any directives and notifications issued by the Authority at any time for the IoT services which use the operator's network.

13.4. The IoT service provider shall implement the IoT testbed and carry out the trial testing of any SIM based IoT services in the live networks before the implementation and present to the Authority.

13.5. Any IoT devices with embedded SIM (eSIM) facility in future shall be based on the "Over-The-Air" provision where it can be re-provisioned remotely over-the-air with a new service provider avoiding sole-service provider lock-in. The eSIM in IoT devices should be allowing the "over-the-air" provisioning of an initial operator subscription, and the subsequent change of subscription from one operator to another.

13.6. The IoT service provider has to provide end to end Quality of Service (QoS) IoT deployment.

13.7. The IoT service providers shall maintain end-to-end network security for the connected devices in their network, and ensure and maintain the privacy of information transmitted over the IoT networks, and it's the network provider's responsibility to set up a secure network.

13.8. The IoT service provider shall maintain a registry for all the IoT devices, including but not limited to owners and focal points in event of any issues,

13.9. The IoT service provider shall ensure security, data protection, privacy and safety of the general public which may get exposed through the use of IoT networks provided by the network providers,

13.10. IoT service providers and the device owners shall be held accountable for any damages to the property of life because of mishandling/malfunctioning of IoT devices,

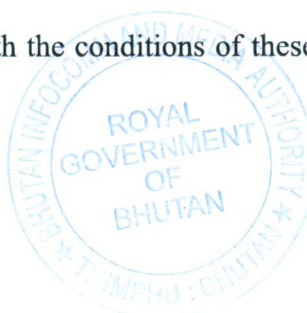
13.11. Devices with pre-fitted eUICC should be allowed to be imported only if it is able to get reconfigured 'Over-the-air' (OTA) with local subscription. GSMA approved guidelines shall be followed for provisioning of new profiles remotely with 'Over-the-air' (OTA) mechanism.

14. Enforcement and Penalties

14.1. Any entity or licensees shall be guilty of an offense if he or she uses the number blocks without prior approval of the Authority.

14.2. Any entity or licensees failing to comply with the conditions of these Plans shall be liable for the penalties as per the Act.

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Annexure I

Acronyms

ATM:	Automatic Teller Machine
eUICC:	Embedded Universal Integrated Circuit Card
ICT:	Information and Communication Technology
IMSI:	International Mobile Subscriber Identity
IoT:	Internet of Things
ISM Band:	Industrial, Scientific and Medical Band
ITU:	International Telecommunication Union
LTE:	Long Term Evolution
M2M:	Machine to Machine
MSISDN:	Mobile Station Integrated Service Digital Network
NSN:	National Significant Number
OTA:	Over-The-Air
QoS:	Quality of Service
SIM:	Subscriber Identity Module

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