GSMA Connected Living

Mobilising the Internet of Things

Enabling the Internet of Things, a world in which consumers and businesses enjoy rich new services, connected by intelligent and secure mobile networks

www.gsma.com/connectedliving

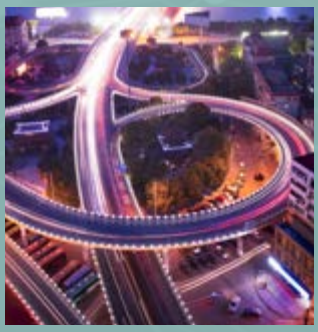
The Connected Living Programme

The Internet of Things (IoT) describes the coordination of numerous machines, devices and appliances connected to the Internet through multiple networks. These connected devices include everyday appliances and machines such as vehicles, utility meters, tracking devices, vending machines, consumer electronics, wearable technology as well as smartphones and tablets.

Machine to Machine (M2M) is an integral part of the IoT and describes the use of applications that are enabled by the communication between two or more machines. M2M technology connects machines, devices and appliances together wirelessly via a variety of communications channels, including IP and SMS, to deliver services with limited direct human intervention. This turns these devices into intelligent assets that open up a range of possibilities for improving how businesses are run.

The GSMA's Connected Living programme is an industry initiative designed to help mobile network operators add value and accelerate the delivery of new connected devices and services in the growing IoT market.

The programme aims to achieve this through industry collaboration, optimising networks and encouraging the development of appropriate regulation. It is also working to develop key enablers that will support the growth of M2M in the immediate future and the IoT in the longer term.



The Connected Living Programme Key Initiatives

Mobile IoT = TRUSTED IoT – Licensed Low Power Wide Area Networks:

THE GSMA IS WORKING WITH MOBILE OPERATORS AND ECOSYSTEM PARTNERS TO DEVELOP LICENSED LOW POWER, WIDE AREA (LPWA) NETWORKS SOLUTIONS THAT WILL ENABLE THE IoT TO SCALE.

Industry Engagement:

THE GSMA IS WORKING WITH OPERATORS TO DEMONSTRATE HOW THEY ARE PROVIDERS OF KEY SERVICES WHICH ENABLE SMART CITIES AND TO ENGAGE WITH AUTOMOTIVE & HEALTH MARKETS.

IoT Big Data:

THE GSMA IS WORKING WITH OPERATORS TO ESTABLISH AN IOT BIG DATA ECOSYSTEM, THROUGH THE DELIVERY OF HARMONISED DATA SETS AND APIS.

Remote SIM Provisioning for M2M:

THE GSMA HAS ENCOURAGED THE INDUSTRY TO IMPLEMENT A SINGLE, ROBUST AND INTEROPERABLE GLOBAL REMOTE SIM SPECIFICATION FOR M2M DEVICES WITH AN EVOLUTION PATH TO CONNECT ALL DEVICES.

Consumer Remote SIM Provisioning:

THE GSMA IS ENABLING THE NATURAL EVOLUTION OF THE SIM FROM PHYSICAL TO DIGITAL, SIMPLIFYING THE CONNECTION OF A WIDER RANGE OF CONSUMER DEVICES THAT ARE CONNECTED BY SECURE MOBILE NETWORKS.

IoT Security:

THE GSMA HAS DEVELOPED IoT SECURITY GUIDELINES TO ENSURE BEST PRACTICE FOR THE SECURE CONNECTION AND MANAGEMENT OF IoT DEVICES ON ANY MOBILE NETWORK.

IoT Business Enablers:

THE GSMA IS WORKING TO CREATE A SUSTAINABLE M2M POLICY AND REGULATORY ENVIRONMENT THAT ENABLES OPERATORS TO UNLOCK THE CONSUMER AND BUSINESS BENEFITS OF THE IoT.

Mobile IoT = TRUSTED IoT: The GSMA is working with the industry to accelerate the commercial availability of cost effective licensed 3GPP LPWA managed solutions

As the trusted and experienced providers of mobile connectivity, network operators are best placed to provide scalable IoT solutions that utilise a range of LPWA delivery technologies. More than one mobile technology is required to support the diverse requirements of the IoT. These technologies need to be standards based, managed by network operators and delivered through licensed spectrum.

Network operators are best placed to manage a full range of IoT solutions through a range of radio networks.

The GSMA is evaluating how IoT applications can be better supported utilising enhanced mobile networks, deploying these networks faster to market and scaling them through collective industry action.

The GSMA has agreed with the industry that NB-IoT, EC-GSM-IoT and LTE-MTC are the future mobile technologies that will enable the successful scaling and standardisation of the IoT.

GLOBAL CONNECTIVITY REVENUE GENERATED BY LPWA TECHNOLOGIES:
$970 MILLION IN 2018
$7.5 BILLION IN 2020

Source: Analysys Mason

CLICK HERE TO LEARN MORE ABOUT MOBILE IoT

Remote and cost-effective environmental water monitoring

LPWA technologies open up a world of connectivity for a huge range of new devices and services and will prove to be the backbone of the IoT.

AT&T and Ericsson are trialling low cost connected sensors to monitor the water quality on stretches of the 430-mile long Chattahoochee River in Atlanta, which serves as drinking water for four million people.

The newly developed sensors will be able to transmit data every 30 minutes and will cost only a small fraction of the original price. At $6,000 each, the sensors currently used in this area are too expensive to be deployed comprehensively and require manual testing of the water in 70 different spots several times a week.

But new LPWA mobile networks, together with other technological advances, look set to make it viable for local stakeholders to remotely and cost-effectively monitor the quality of the water along the entire 430 miles of the river without the need to collect samples by hand.

The deployment of these innovative sensors highlight how new mobile technologies could help safeguard the environment and the supply of vital natural resources, such as water.

IoT Security: Promoting best practice for the secure development, design and deployment of IoT services on any mobile network

The GSMA has developed IoT Security Guidelines to ensure best practice for the secure connection and management of IoT devices on any mobile network. Based on the expertise and collective knowledge of the mobile telecommunications industry, the guidelines offer valuable insights and recommendations for IoT service providers, IoT device manufacturers and facilitate the development of trusted and secure IoT solutions. A unified and robust approach to security will create a trusted, reliable environment that can scale as the market grows.

The GSMA is working to get best practice security guidelines adopted, so that machines communicate via the mobile network in the most secure way.

The security of connected devices in a large scale network depends on all stakeholders following a unified approach.

Operators are established as the trusted, licensed provider of secure IoT solutions, ensuring the long term sustainability and growth of the market.

CLICK HERE TO LEARN MORE ABOUT IoT SECURITY

Automotive IoT Security

Every proficient hacker knows a physical device will be the weakest point of entry into an isolated communications network.

Hackers resort to a range of strategies and tools to break into computer systems and seek out vulnerabilities in IoT solutions.

Automotive IoT solutions comprise numerous components and capabilities which make them vulnerable for attacks, such as telematic systems, central computing systems, sensors and wireless communication systems.

The only way to guard against such attacks effectively, on top of administrative interface security, is by building security into the solution at its inception.

Cost-effective measures which secure the administrative interfaces available on the endpoint service are trusted computing bases, secured network communications, restricted application behaviour and enforced tamper resistance.

CLICK HERE TO LEARN MORE ABOUT AUTOMOTIVE IoT SECURITY

Remote SIM Provisioning for M2M: A single, common and interoperable global embedded SIM specification to help further accelerate the growing market

The GSMA has developed a specification that enables the remote 'over the air' provisioning of M2M devices that are often hermetically sealed or installed in hazardous or remote locations. Adopted and launched by global operators and SIM suppliers, the specification promotes a common, global and interoperable remote provisioning architecture to ensure technical solutions that reduce costs, boost security and accelerate the rapidly growing M2M market.

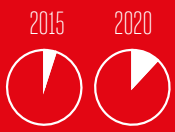
The GSMA is supporting all stakeholders to implement a single, robust and interoperable global remote SIM specification for M2M devices with an evolution path to connect all devices.

The GSMA's remote provisioning specification allows mobile network operators to provide scalable, reliable and secure connectivity for M2M connected devices, removing the need for each operator to develop their own technical solution.

The GSMA Embedded SIM Specification is live and available now from 22 leading mobile operators, so the wider industry should adopt it now to enable future proof M2M solutions.

CLICK HERE TO LEARN MORE ABOUT REMOTE SIM PROVISIONING FOR M2M

CELLULAR M2M AND LPWA COULD REPRESENT 20% OF THE GLOBAL M2M MARKET BY 2020 UP FROM 6% in 2015



Source: GSMAi

Embedded SIM commercial solution available

The different devices and use cases that are implemented in M2M services have certain characteristics that require a remote SIM provisioning capability. This can happen, for example, because the SIM is inaccessible in the device at manufacture, the provisioning of service is done to a sealed device or because the global nature of the business means the destination country of the product is not known or could change during the lifetime of the product.

If the GSMA Embedded SIM Specification is not implemented across multiple M2M ecosystems across different industry verticals it will lead to fragmentation of the market.

Remote SIM Provisioning for Consumer Devices: Enabling a new generation of connected consumer devices

The mobile industry has released a new global SIM specification that enables consumers to remotely and independently connect companion consumer devices such as smart watches, health bands, tablets and other devices to a mobile network.

This SIM specification will encourage device manufacturers to create a new generation of lighter, mobile connected devices that are better suited for wearable technology applications. These new smart connected devices use smaller chips that don't require as much space as a typical SIM card but retain their security benefits.

This is the first industry backed global consumer remote SIM specification. A global approach and consistent user experience will grow the Internet of Things by allowing consumer device manufacturers to build a new range of products for global deployment based on this common embedded SIM architecture.

The GSMA has addressed the market for both consumer and M2M devices.

The remote activation of the SIM simplifies the connection of a new generation of devices to a mobile subscription and enables consumers to enjoy rich new services, connected by secure mobile networks.

The GSMA's Remote SIM Provisioning specification has minimal impact on existing systems and network infrastructure and removes the need for operators to develop their own technical solutions, reducing lifetime costs and enhancing security.

CLICK HERE TO LEARN MORE ABOUT REMOTE SIM PROVISIONING FOR CONSUMER DEVICES

Samsung launches first device with GSMA-compliant embedded SIM

The GSMA Remote SIM Provisioning specification for consumer devices is the only common, interoperable and global specification that has the backing of the mobile industry and lets consumers with a mobile subscription remotely connect their devices to a mobile network.

The Samsung Gear S2 classic 3G is the first device in the market to be equipped with an embedded SIM compliant to the GSMA Remote SIM Provisioning architecture. The company has worked with several industry partners, including mobile network operators and SIM Vendors, to create a technical specification which enables consumers to download a mobile network operator's profile to embedded SIM-enabled devices.

It's a step closer to a world without physical SIM cards and marks the beginning of a truly connected world in which consumers have more control over their devices.

The GSMA Remote SIM Provisioning specification gives consumers the freedom to remotely and securely connect devices, such as smart watches, fitness trackers, and tablets, to a mobile network of their choice.

A common approach to the standardisation of a fully interoperable embedded SIM specification will help create a consistent user experience, build trust in the privacy of data and the security of devices, enable manufacturers to build smaller and lighter products, and accelerate the growth of the IoT market.

IoT Business Enablers - IoT Policy and Regulation:

The GSMA is working to create a sustainable policy and regulatory environment to support the successful scaling of the IoT

Governments and regulators can unlock the consumer and business benefits of the IoT by implementing policies that promote innovation and investment, and by creating regulatory frameworks that build trust and network capability. This will give confidence to consumers and the industry that will drive adoption of the IoT.

The GSMA is working to create a sustainable policy and regulatory environment to support the successful scaling of the IoT.

Promoting government support for the growth of M2M services is the most effective way of establishing a trusted network, capable of realising the socio-economic benefits of the IoT.

Regulatory frameworks should apply consistently across all IoT players in order to provide clarity, ensure a level playing field for the industry and build trust and confidence for end-users.

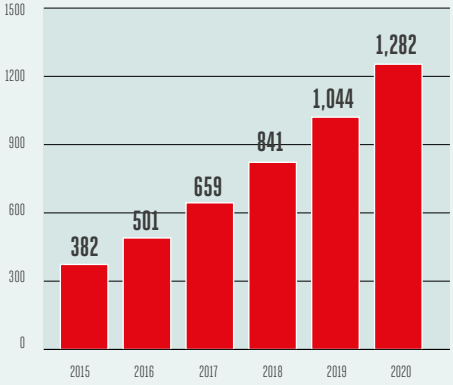
CLICK HERE TO LEARN MORE ABOUT IoT POLICY AND REGULATION

GSMA digital health State of the Nation

Digital health is a huge area of growth for mobile network operators and the addressable revenue is anticipated to increase almost threefold from 2015 to 2020. The GSMA digital health 'State of the Nation' review aims to understand the successes and challenges in deploying large scale commercial digital health solutions, in order to identify appropriate collective action.

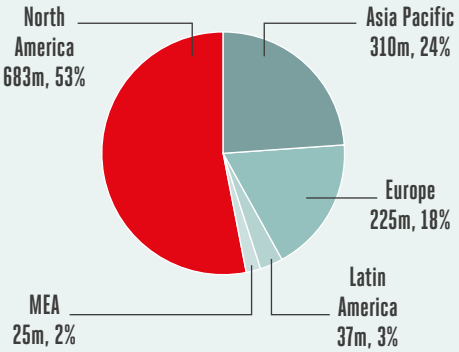
GLOBAL HEALTH MNO ADDRESSABLE REVENUE SET TO INCREASE ALMOST THREEFOLD FROM 2015 TO 2020

Worldwide connected health MNO expected revenue, USD $ million



Source: Machina Research

Global connected MNO health expected revenue opportunity by region, 2020 estimate



CONNECTED HEALTH MNO EXPECTED REVENUE FORECAST TO REACH NEARLY $1.3BN IN 2020, 43% OF WHICH IS EXPECTED TO BE IN ASSISTED LIVING FOR THE ELDERLY AND INFIRM

LARGEST MARKETS FOR DIGITAL HEALTH SERVICES WILL BE US/CANADA WITH 53% MARKET SHARE, ASIA PACIFIC 24% AND EUROPE 18%

IoT Big Data: Establishing an IoT Big Data Ecosystem to realise the full potential of the IoT

To help unlock the full value of IoT Big Data, the GSMA and its mobile operator partners are establishing an IoT Big Data Ecosystem (IoT BDE). The IoT BDE aims to make harmonised data sets from numerous vertical sectors available to developers and the wider industry. A common approach to the harmonisation of data sets will accelerate the development of new IoT solutions and facilitate the monetisation of new data assets. The IoT BDE will be applicable across all vertical markets, enabling value creation for numerous stakeholder groups.

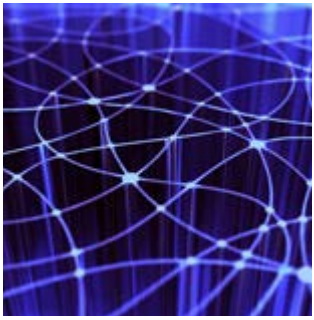
The GSMA is working with operators to make harmonised data sets and APIs available to encourage the growth of IoT Big Data solutions.

Mobile operators have the opportunity to become key players in the IoT BDE by utilising their existing capabilities, resources and industry expertise.

Cross-industry cooperation and collaboration will help in the development of new data-centric IoT solutions, ensuring the creation of common specifications and the full availability of diverse and harmonised data.

TODAY FEWER THAN 15% OF IoT APPLICATIONS ARE BUILT ON MORE THAN ONE SOURCE OF DATA

Source: Capgemini



CLICK HERE TO LEARN MORE ABOUT IoT BIG DATA

Unlocking the full value of IoT data across verticals

Data silos constitute valuable assets and great monetisation potential. To illustrate how data from multiple sources could be combined and utilised to the benefit of all parties, consider the following examples:

SMART CITIES

Data from various sources could be used to improve traffic flow and optimise public transport in real time. For example, sensor data from public and private vehicles, traffic lights and road sensors may be combined with information on weather and large events or festivals, in order to optimise traffic flow and transport for event patrons.

AUTOMOTIVE

Data sources such as car sensor data from a private vehicle, weather information from a government source and driver information could be cross-referenced to enable services such as usage-based insurance, underwriting and pre-emptive maintenance. These and similar services could be offered to many parties including drivers, automotive manufacturers and insurance companies.

AGRICULTURE

Data from various sources such as soil conditions, climate, crop conditions, farm equipment, irrigation sensors, air pollution, cattle conditions, grain silos and more could be analysed to produce solutions that improve efficiency and increase yield, e.g. calculating the optimal level of fertilisers, stocking of feed and servicing of equipment.

$1.1 TRILLION

TOTAL ADDRESSABLE REVENUE OPPORTUNITY FOR MOBILE NETWORK OPERATORS IN 2020

Source: Machina Research, 2016

Industry Engagement: The GSMA is working to align market perspectives, drive adoption and grow the market across key vertical sectors

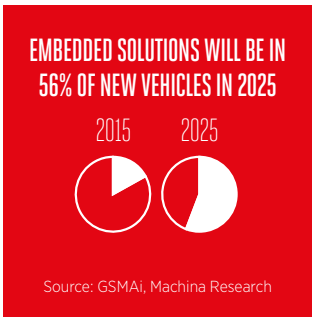
The GSMA works closely with its partners in the industry to align its strategy and to ensure its initiatives are adopted. By determining common capabilities we will make a positive impact on the industry creating solid foundations for the Internet of Things and enabling it to grow.

Regular engagement and communication with the industry will lead to better market understanding, resulting in improved customer service, a superior user experience and greater connectivity, enabling the market to develop.

Smart Cities: Mobile connectivity is the fuel for smart city solutions and will help cities manage a wide array of sectors more efficiently, improving the quality of life of its citizens in a sustainable way.

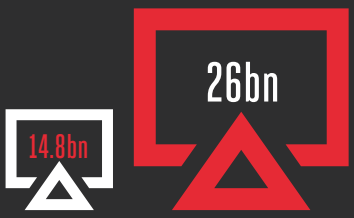
Automotive: The automotive sector is one of the most valuable and rapidly growing areas of the IoT, making a secure, efficient and cost-effective IoT highly desirable for automakers and mobile operators alike.

Health: Interoperability of new digital health solutions will improve the delivery of health care by making the right data available to the right people at the right time.

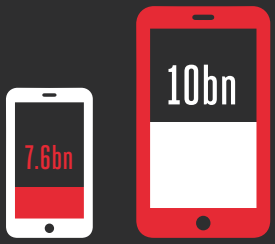


Connected Living by 2020

Total Connected Devices

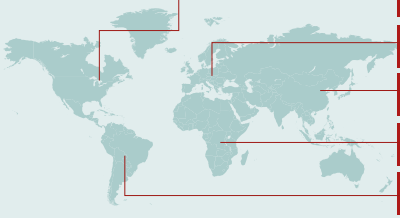


Total Mobile Devices



Total Addressable Opportunity For Mobile Network Operators in 2020

$1.1 TRILLION



- **North America** $266 Billion
- **Europe** $271 Billion
- **Asia Pacific** $410 Billion
- **Middle East/Africa** $65 Billion
- **Latin America** $74.3 Billion

2020 Addressable opportunity for MNO's in selected vertical sectors

Health	Automotive	Misc. Consumer Electronics	PC's/Laptops	Smart Cities*	Other M2M	Hansets/Tablets
$7.4 Billion	$150 Billion	$100 Billion	$362 Billion	$45 Billion	$96 Billion	$347 Billion

* GSMA definition of Smart Cities

The socioeconomic impact of Connected Living by 2020

One in nine

The number of lives saved in road accidents in developed countries over the next four years due to mobile enabled in-car emergency services

A week back every year

Smart commute interventions in developing world cities will give commuters back a whole week's worth of time every year

1.2 billion trees

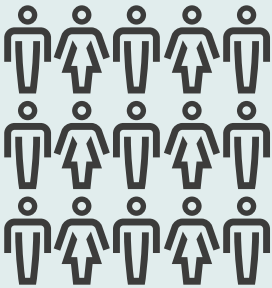
In developed world cities, smart metering will reduce carbon emissions by 27 million tonnes – equivalent to planting more than 1.2 billion trees

$400 billion

The amount saved in 2017 from the annual healthcare bill in developed countries as a result of mobile healthcare solutions

One million

The number of lives digital health will save in sub-Saharan Africa over the next four years



40 million

The number of people in developing countries, equivalent to the population of Kenya, that can be fed each year due to fleet telematics preventing food wastage during transport

10 million

The number of homes in India powered by energy saved using mobile-enabled smart meters

Research conducted by PwC for the GSMA 2014

Connected Living

GSMA
Floor 2, The Walbrook Building,
25 Walbrook, London EC4N 8AF,
United Kingdom

www.gsma.com/connectedliving
connectedliving@gsma.com
#ConnectedLiving