

5G, IoT, UN-SDG ...
OMA LwM2M,
IPSO

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12-5-2018

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Sustainable Development Goals - UN

Several of the UN-SDG need multiple data points which are essential to foresee the day-to-day outcome of the actions put in place for advancement of these goals. Multiple key technologies would play critical role for getting these UN-SDGs established, running and monitored for success. In many of the needed technologies, 5G & IoT would play a crucial role. This paper would ponder over few ways surrounding the enablement of some of these SDGs using 5G/IoT technologies.

No Poverty

Utilization of the 5G/IoT technologies for enabling distribution of needful resources across the population. Building relevant tools to help identify resources which are in excess supply, pooling information on wastage and distribution on demand. These include material, monetary and other relevant resources to arrive at right balance in governance of equitable distribution. Smaller footprint devices communicating with longer lifespan can help change the landscape of such areas.

Zero Hunger

Food production, distribution and climate changes are becoming major factors in changing the pattern of hunger zones. Ability to micro-monitor food production with relevant sensing, identification of soil quality, changes in climate patterns help maximize food production. 5G/IoT technologies help in expanding the scope of sensing different aspects of food production, distribution and consumption patterns.

Good Health and Well-Being

Connected health, networking the world of medicine, insurance and in turn helping the good health and well-being is growing. Technology both 5G/IoT would add big value in shoring up needed aspects for such benefits to the society.

Quality Education

Expanding remote education like live multi-connected classrooms, smart classrooms, remote terrain classrooms and mobile streaming need seamless connectivity. 5G provides abilities to enable the needs for quality education, as well as turning educational hubs into a well-orchestrated smart place using IoT. Connectivity brings a remote terrain or under developed terrain quickly into main stream with quality education capacities.

Gender Equality

Bringing in gender equality needs a wide range of actions and insights to be achieved. Empowering relevant segment of the society, technology adds right tools for safety, security and creates capabilities to enable law to address problems with a more straightforward method. 5G/IoT provides relevant features to enable these needs of the SDG.

Clean Water and Sanitation

Improving clean water availability and water availability is a big challenge. Pollution of water and identification of levels of pollution becoming important. As cities expand into megacities challenges surrounding water delivery is throwing big challenges in harnessing information from various facilities of water delivery. 5G/IoT provides vast enablement to the water related services both in the area of sensing, delivery structure and surrounding services.

Affordable and Clean Energy

Affordable and Clean Energy leading to building of modern energy producing and distribution systems. Technology like 5G/IoT becomes an integral part of helping broad information assessment to have fine grained controls across the distribution systems.

Decent Work and Economic Growth

Sustainable economic growth needs new areas of work and equitable distribution with multiple opportunities for population to work. 5G and IoT independently provides capacities to increase that opportunity. The technology solution from 5G/IoT though provides limited impact to the SDG through new areas of economic growth, provides ability to augment this SDG indirectly through multiple ways by helping services which directly impact the SDG.

Industry, Innovation and Infrastructure

Industry, innovation and infrastructure are all pointing towards a massive change in information and communication to empower communities. 5G/IoT provides necessary backbone infrastructure and kicks off a series of thinking and developmental vector for this SDG.

Reduced Inequalities

Reducing inequalities is outlined in the SDG with large disparities health, education and other assets. The 5G rolls out reach and availability of quality contents towards aiming at mapping the digital divide in societies. IoT brings abilities to sense societies pulse across different assets on to identify the trends and improvements on real-time basis.

Sustainable Cities and Communities

Improving sustainable conditions among growing crowded cities is of importance. The SDG needs plugin into the infrastructure, community conditions, continuous assessment of impact on developmental work on existing infrastructure and communities. Ideally it needs technologies bringing back information and connect with various existing and developing infrastructure. 5G/IoT is well suited to serve this goal.

Responsible Consumption and Production

The SDG is promoting resource and energy efficiency, sustainable infrastructure. The SDG fulfilment needs new service levels for various development of this SDG. 5G/IoT with similar capabilities from Sustainable Cities and Communities SDG and helping to improve relevant parameters to fulfil this goal.

Climate Action

Climate changes are disrupting many areas of economies. 5G/IoT brings in the ability to gather information on the SDG via multiple interfaces from the society in general. 5G/IoT could provide effective feedback loop during varies times of need when climate catastrophes are on the play.

Life Below Water

Life below water in general is requiring monitoring vast areas of water bodies and gather information which is no less than the entire earth. 5G/IoT combination provides needed abilities in volume and breadth to enhance the coverage of this goal.

Life on Land

Life on land is deteriorating and focus of the SDG is to improve the conditions in the forest areas and not to let them degrade further. 5G/IoT combination provides effective tools to manage the forest areas and key reserves with innovative abilities to sustain the green cover through identification of necessary events surrounding the degradation and/or deforestation.

Peace, Justice and Institutions

This SDG has the key to many of the problems surrounding human civilization. Though achievement of this goal is not attained through the help of 5G/IoT but providing key platform capabilities for robust execution of this goal.

Partnership for the Goals

The goal is giving a clarion call to bring interworking at various levels of governance within a country as well as between countries. The goal is to align various investments to achieve sustainable development objectives. 5G/IoT is one such unique investment which can provide such opportunity to elevate the goal towards achievement.

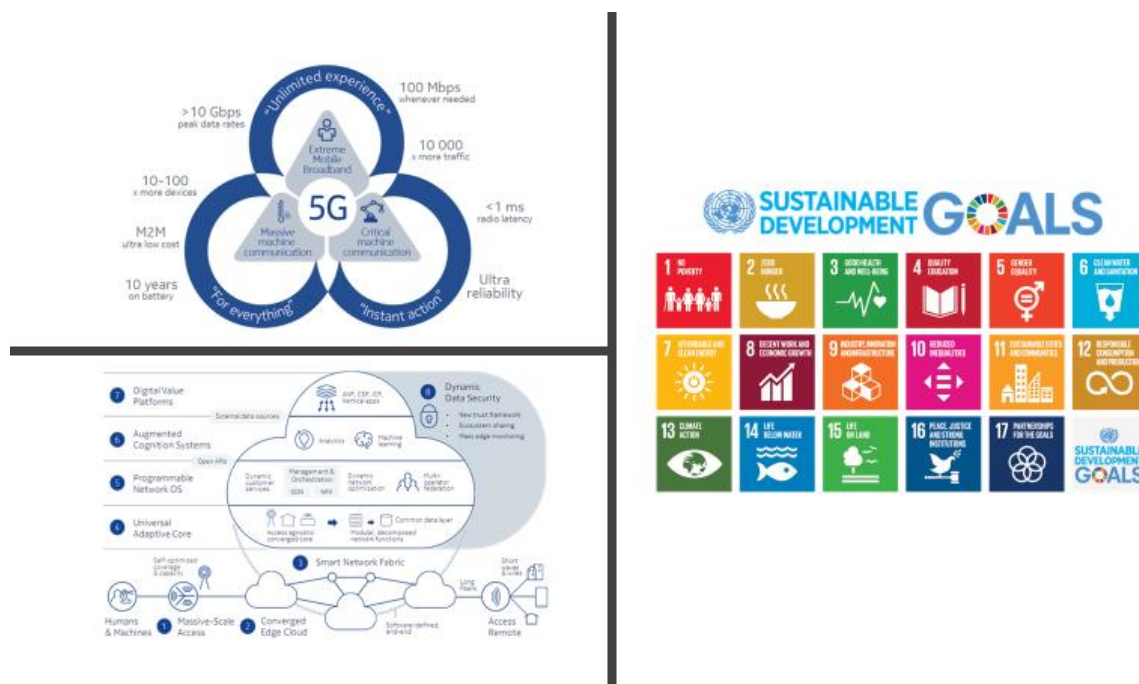


Image Courtesy: Nokia & UN

5G a short overview

Network slicing enables multiple logical networks to be run on a common physical infrastructure.

Major Network Slice Types (Standardised by 3GPP)

- eMBB - Throughput (<20 Gbps peak data rate)
- URLLC - Reliability and Latency (>1 ms in radio interface)
- MIIoT - Connection Density (<10⁶ per km²)

The possible usage segments from 5G core capabilities

- Latency for industrial robotic and automated production environment
- Reliability for V2X communications and operations
- Throughput for Smart Cities

Some high-level use cases which can be driven on 5G

- Video analytics for public safety
- High resolution video feed
- Geo tagging for public safety
- Augmented reality for mobile users like maps with live augmented video feed
- Machine learning for public utilities like parking presence, traffic situations, weather etc.,

OMA LwM2M & 5G/IoT

OMA LwM2M protocol targets the constrained devices for Device Management and Service Enablement. In a 5G environment IoT devices and sensors are the planned projected growth . LwM2M targets these devices through its efficient protocol and definitions built on IETF Core RFCs and drafts. As the growth of the major devices is in IoT domain in 5G and is targeted by LwM2M, it makes it an ideal candidate to further expand the utilization of all types of device(s) and Device Management in 5G through LwM2M. In the following section details have been evaluated on how LwM2M can target various usages

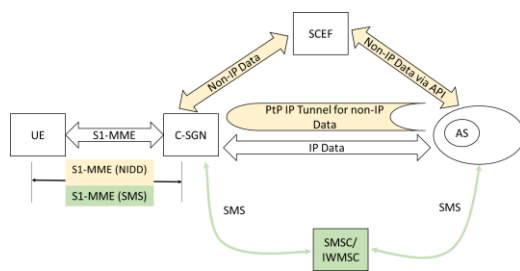
- Device Management: LwM2M in v1.1 already combined with efficient device management undertaking capabilities for FCAPS, except Charging
 - <http://www.openmobilealliance.org/wp/OMNA/LwM2M/LwM2MRegistry.html>
OMNA object registry for LwM2M
- Service Enablement: LwM2M objects are registered from various industry bodies, consortiums and individual organizations to make it robust service enablement capabilities
 - GSMA objects for Mobile performance in a network
 - oneM2M for service layer orchestration for oneM2M
 - IPSO alliance smart objects for smart meter, pressure/temperature sensors etc.
 - openAIS for solid state lighting controls
- Application Enablement: LwM2M provides abilities to actualize the needs of application area by providing right context and connectivity to central server
 - Individual big companies have registered various needs for the application enablement
 - These range from general purpose log file management to specific Energy Meter needs
- Enabling Analytics: In the process of encompassing wide range of data generated from multiple device and end points, naturally LwM2M server becomes single source of largest analytics feed

OMA LwM2M - Device Management Features for 5G/IoT

- Device onboarding & Network onboarding
- Setup of monitors on the device functioning and network operational actions
- Configuring service capabilities and application server interoperative readiness
- Logging on operational aspects of the devices

OMA LwM2M & 3GPP ClOT

Courtesy: 3GPP



3GPP definitions of ClOT (Cellular IoT) brings in ability to connect massive amounts of devices which can work with 5G network sending small amounts of data over long durations. This kind of pattern helps conserve battery life and put the device in the field for close to 10 years in the field. The feature set has defined

various path ways for the data to flow from the device on one side of 3GPP network to the necessary servers residing across the 3GPP network on the other side. Several capabilities to make the interaction with network efficient and need based has brought good improvements.

OMA LwM2M has captured these advantages provided by the 3GPP ClOT (Cellular IoT) project in the area of MlOT (Mobile IoT) and mapped the existing capabilities of Device Management & Service Enablement on top of these new enhancements for NIDD (non-IP data delivery) mechanisms.

An UE (user equipment) can connect via SGi/PGW or it can work through SCEF paths (top path) in the 3GPP ClOT definitions. OMA LwM2M can work with both paths depending on the operator deployment scenario.

OMA LwM2M - Service Management Features for 5G/IoT

OMNA (OMA Naming Authority) provides a comprehensive object registration from various 3rd party organizations & standards bodies which enable relevant services in the IoT arena, some sample services listed below

- Mobile Radio Resource information from User Equipment for analytics & intervention
- Energy Meter Service Management

- Water meter Service Management
- Parameter based Objects
 - Temperature data cluster
 - Pressure data cluster
 - Battery level reading data cluster
 - Accelerometer information
 - Location information

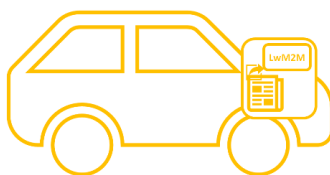
OMA LwM2M Application Enablement Features for 5G/IoT

- End 2 end security for application data to be protected from the networks and hops in between which generally create porousness (for hacks)
- Ability to identify the host where the LwM2M client resides to exchange relevant information and activate executional parameters on to the host system
- OMA LwM2M is one of the dominant device management protocol required under oneM2M for enabling the application layer
- User Equipment application data can be harnessed through LwM2M for enhancing the complete feedback of any service running end to end, for example UE side measurements of Mobile network parameters as seen from UE could help correlate necessary events in totality.

OMA LwM2M Portfolio Object

OMA LwM2M has defined a Portfolio Object to know the host information and also to access securely contents from the host where it is residing. These usage patterns where the LwM2M client resides in a bigger host like

- Automobile
- Vending Machines
- Set Top Boxes
- ATM machines



Further Reading:

