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5G Observatory

DRAFT - Concept paper – 5G deployment

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IDATE DIGIWORLD

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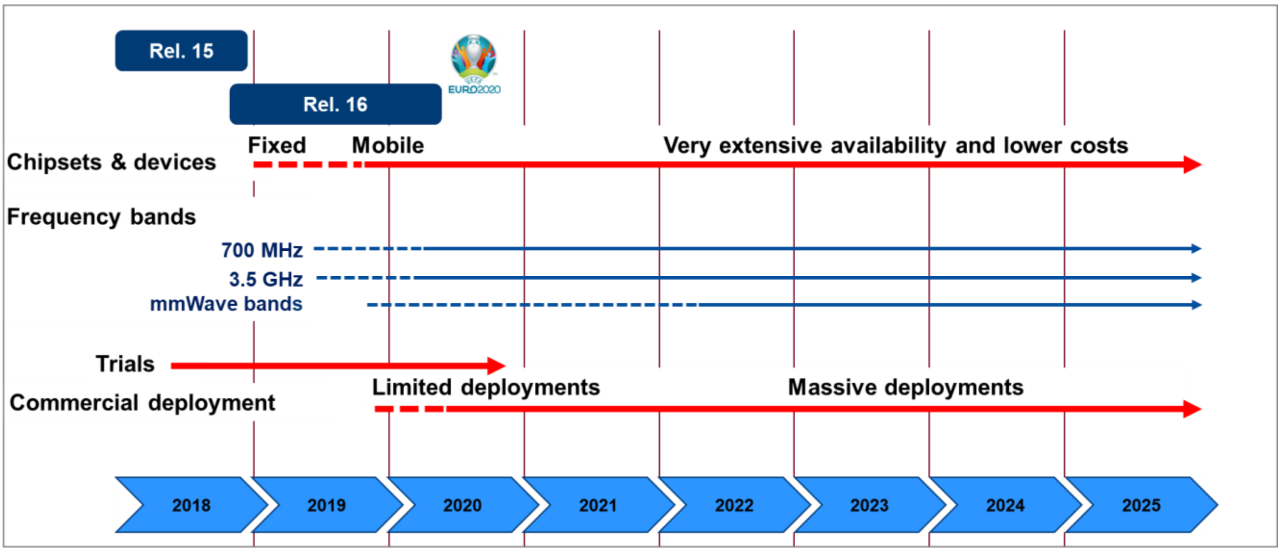
1. Introduction

Launched in September 2018, the European 5G Observatory focussed in its first phase[1] on indicators showing 5G readiness in Member States. These indicators are primarily based on the amount of radio spectrum and national 5G strategies available at national level, as well as on preparatory actions by market players in view of commercial launch in cities as well as large-scale trials and pilots.

Figure 1: 5G roadmap in Europe



Source: IDATE DigiWorld

As we are now moving into the commercial deployment phase of 5G networks, this note is to initiate a reflection on the identification of new indicators to start monitoring the commercial availability of 5G connectivity services in Member States.

2. Indicators used for 5G connectivity in the first phase of the 5G Observatory

The first phase of 5G around the world can be seen as an extension of 4G with eMBB (enhanced Mobile Broadband) services offering faster speeds with 5G radio access network providing more capacity.

5G progress in European countries is monitored in the 5G Observatory through the amount of radio spectrum available for 5G in the pioneer bands[2] and the availability of national 5G strategies (at national level).

In this configuration, more traditional indicators such as the percentage of users in a population, the percentage and mapping of geographical area covered by the service (wireless signal strength, the average download and upload speeds, capacities available) will be key data for the monitoring of service availability and quality.

[1] July 2018 – End June 2019

[2] 700 MHz, 3.6 GHz and 26 GHz

Table 1: Phase 1 indicators

Description	Indicators
Market	Number of 5G subscriptions
Coverage	Population coverage Geographical coverage
Quality of service	Wireless signal strength Average download and upload speeds Capacities available

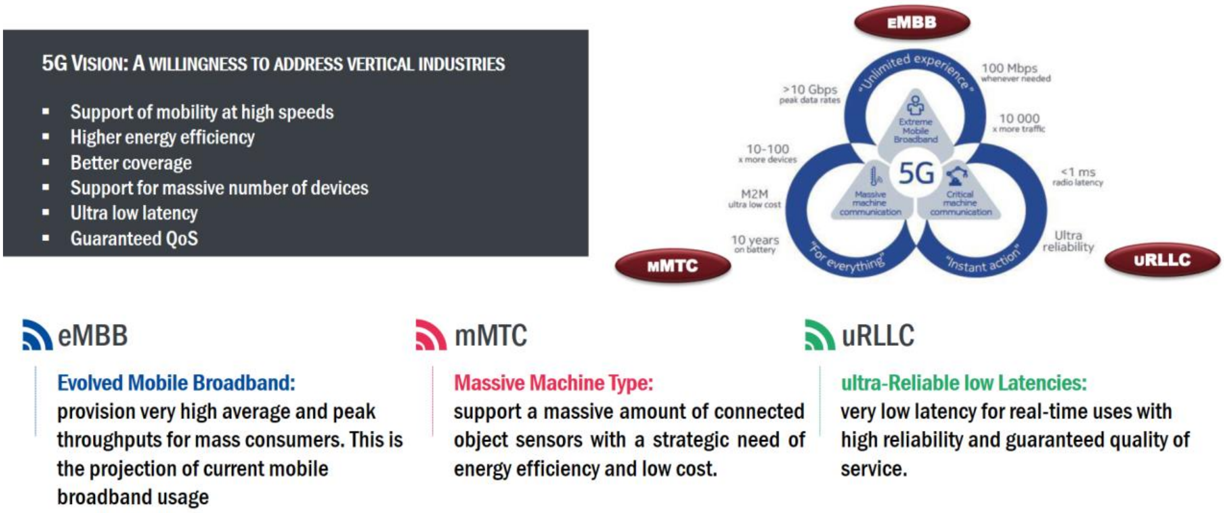
3. New indicators for 5G-specific use cases (second-phase of the 5G Observatory)

3.1. Context

In a second phase, it is expected that 5G will meet increasingly demanding connectivity requirements, especially to address specific needs in vertical industries. In the long term, the value from professional (B2B) 5G uses may even exceed the value from the traditional mobile markets and the critical importance for the digital transformation of industrial sectors is expected to be swiftly increasing.

The broad range of these connectivity requirements is often illustrated using the ITU "triangle" of 5G usage scenarios (see figure below).

Figure 2: 5G Objective is to be more than just an increase in bandwidth capacity



Source: IDATE DigiWorld

Many use cases have already been identified for vertical industries such as automotive, health, energy, transport, public safety and manufacturing.

Table 2: 5G IoT main use cases

Industry	eMBB	Massive MTC	URLLC
Automotive	- Telematics (Entertainment)	- Telematics (non related to entertainment)	- Self driving and safety use cases
Health		- Remote Monitoring of health and wellness - Asset management and intervention management in hospitals - Smart Medication	- Robotics - Emergency care management
Energy	- Infrastructure and asset management (drones and video)	- Advanced Metering Use cases - Infrastructure and asset management (remote monitoring)	- Grid Management and Automation
Transport	- Broadband connectivity through WiFi access in transportation - High Resolution video / mobile TV based applications	- Asset tracking and fleet management	- Self driving truck / bus
Public Safety			- Rapid Disaster Response - Public Event Management - Critical Asset Protection - Remote Area Coverage
Manufacturing	- VR/AR mobile equipments	- Asset monitoring and fleet management - Predictive Maintenance - Integration with the value chain: data collection - Wearables and sensors: data collection	- Automation, remote operation and control

Source: IDATE DigiWorld

3.2. Indicators

Against this background, we could consider four “dimensions” which could be used to describe the nature of 5G connectivity in the context of the various use cases. These “dimensions” could be used to start the reflection on the identification of key indicators to monitor 5G deployment:

1. Wide-area and hot-spot coverage
2. QoS (Service quality level)
3. Focussed and local deployment patterns
4. Other service characteristics

3.2.1. Dimension 1: Wide-area and hot-spot 5G coverage

This dimension reflects the enhanced mobile broadband feature of 5G, which will be the enabler for enhanced and new mobile consumer applications. Early deployment indicators could reflect the availability of 5G infrastructures, such as base station using 5G pioneer bands, base stations connected with fibre and the density of such base stations. Ultimately, coverage and quality maps should be developed reflecting 5G service features.

3.2.2. Dimension 2: Service quality level

Extending on dimension 1 already reflecting some service quality features, some applications will require specific level of connectivity quality. These levels will become more sophisticated than first attempts made in the context of 4G or voice calls. A relevant number of service levels/service categories could be defined for monitoring purpose, in relation to the requirements they can meet (e.g. response time/latency, reliability, peak data traffic, user device mobility, uplink/downlink symmetry, etc).

3.2.3. Dimension 3: Focussed and local deployment patterns / Private networks

Not all vertical industry applications relying on advanced 5G connectivity will require ubiquitous geographical availability. For example, factories relying on local 5G usage as a cable substitute will only need local coverage, connected cars will only need connectivity along transport paths, etc. A possible way forward would be to define the geographical deployment pattern for main types of applications, and to monitor the evolution of coverage within each target deployment pattern (e.g. percentage of main transport paths with uninterrupted 5G coverage, percentage of socio-economic driver zones with 5G service, area traffic capacity).

Private networks will be deployed for vertical players mainly using unlicensed bands. It should be noted that some licensed bands are reserved for these vertical players such as in Germany (3.7-3.8 GHz). Operations of the private networks could be subcontracted to third parties including the commercial mobile operators.

3.2.4. Dimension 4: Other service characteristics

New network functionalities are emerging together with 5G connectivity (although not strictly part – yet - of 5G standards). These include “network slicing”, “mobile edge computing” (MEC), distributed cloud facilities, or enhanced reliability. There should be a means to characterise (and possibly quantify) the functionalities available in given networks / geographical areas. An example of such reporting of functional capabilities could be the percentage of target geographical areas offering MEC service with a given storage/computing capacity and reliability of connection. Another example would be the capacity of communications services available for a given application type (e.g. PPDR-compatible, specifying for example the 5G network capacity available to emergency services in case of pre-emption of commercial 5G service). Another aspect could include information for example on redundancy of architecture/infrastructure equipment to be able to face cyber security threats, or terrorist attacks, the percentage/number of base stations backhauled with fibre connection (or offering a minimum capacity, such as min. 3Gbps backhauling), density of network access points in relevant areas, plurality of network equipment suppliers (for security reason), internal network security ratings (this could be essential for example for users of network slicing), network energy efficiency and rate of use of renewable energy, etc.

The type of data necessary to establish indicators under the last category may include confidential or business proprietary information and could therefore be difficult to collect.

3.2.5. Summary

Table 3 below provides a summary of the proposed indicators for the phase 2 of the 5G Observatory:

Table 3: Phase 2 indicators

Dimensions	Description	Indicators
1. Wide-area and hot-spot coverage	Coverage indicators	- Early deployment indicators - Number of 5G base stations (Base Stations using 5G pioneer bands) - Coverage & quality maps
2. QoS (Service quality level)	Service levels/service categories defined for monitoring purpose, in relation to the requirements they can meet	- Response time/latency - Reliability - Peak data traffic - User device mobility - Uplink/downlink symmetry - etc.
3. Focussed and local deployment patterns / Private networks	Geographical deployment pattern for main types of applications	- Coverage within each target deployment pattern - Number of private networks
4. Other service characteristics	“Network slicing”, “mobile edge computing” (MEC), distributed cloud facilities, or enhanced reliability	- Percentage of target geographical areas offering MEC service - Capacity of communications services available for a given application type

4. Closing comment

As a general comment, we could consider the prospect that the distinction between mobile and fixed communications is likely to become increasingly blurred in a 5G environment. Therefore, it may be useful to consider, from the start, the implications of the possible convergence of mobile/fixed indicators.