

5G EVE

5GPPP Arch WG

5G EVE KPIs for Media & Entertainment
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5G EVE

Two groups sharing some interest in KPIs :

1. The 5G Infrastructure Public Private Partnership (5G PPP) is a joint initiative between the European Commission and European ICT industry (ICT manufacturers, telecommunications operators, service providers, SMEs and researcher Institutions).
 1. 5G PPP is working in 5G KPIs for vertical industries, funding in Europe several ongoing H2020 European research projects with main Industry sectors companies
 2. The 5G PPP will deliver solutions, architectures, technologies and standards for the ubiquitous next generation communication infrastructures of the coming decade



5G European Validation platform for Extensive trials



- Build a **5G end-to-end facility**
 - Develop a common methodology for consistently performing tests, KPI evaluation, technology-benchmarking, and performance diagnosis.
- Work with important **verticals**, experts in sectors like **energy, transport, smart city, tourism** and **manufacturing** (industry 4.0)

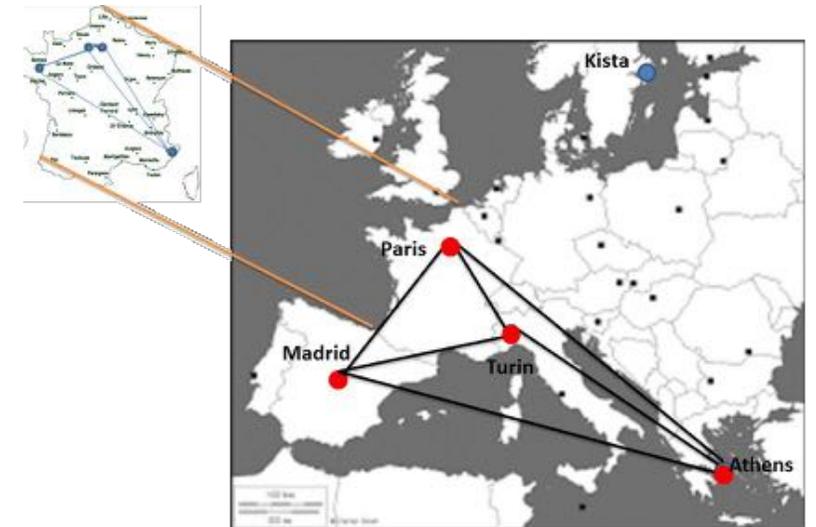


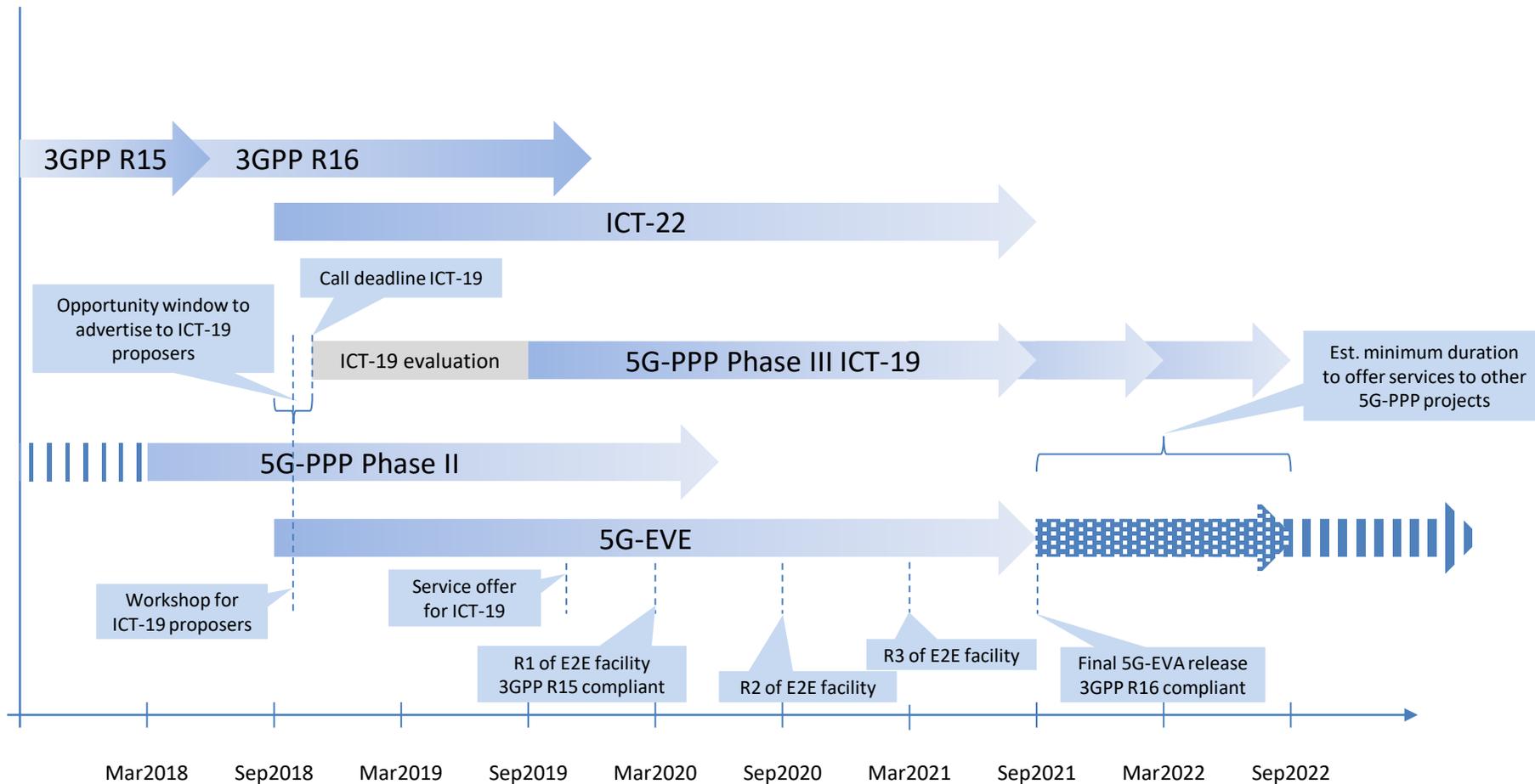
Figure 2: Location of the four European site facilities



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5G EVE Schedule



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5G-EVE Main Use cases (12 sub use cases in total)

a/a	Use Case	Description
1	Use Case 1	Smart Transport – Intelligent Railway for smart mobility - TRENITALIA
2	Use Case 2	Smart Tourism - Augmented Fair experience - SEGITTUR - Spain
3	Use Case 3a	Industry 4.0 – Autonomous vehicles in manufacturing environments – ASTI Spain
4	Use Case 3b	Industry 4.0 – Autonomous vehicles in manufacturing environments – Ericsson GR
5	Use Case 4	Utilities - Smart Energy - Fault management for distributed electricity generation in smart grids – WINGS GR / EDF FR
6	Use Case 5a	Smart cities - Safety and Environment - Smart Turin – COMUNE DI TORINO Italy
7	Use Case 5b	Smart cities - Safety and Environment – eHealth/eAmbulance – NOKIA GR
8	Use Case 5c	Smart cities - Safety and Environment – Health Monitoring and Forecasting, Smart Mobility, Smart Home – WINGS GR
9	Use Case 6a	Media & Entertainment – UHF Media – TELEFONICA Spain
10	Use Case 6b	Media & Entertainment – On-Site Live Event Experience – TELEFONICA Spain
11	Use Case 6c	Media & Entertainment – Immersive and Integrated Media – TELEFONICA Spain
12	Use Case 6d	Virtual Visit – Virtual 360° Visit for real estate or tourism – ORANGE FR



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5G EVE proposal to identify KPIs consensus

Main strategy ideas:

1. Select **one Use Case like Multimedia** to contribute with solid KPIs consensus
2. Look for **experts in Multimedia** (e.g. VQEG) to discuss/validate KPI definition
3. **Alignment with ITU-T KPIs concept**, so 5G KPIs is another facilitator for verticals KPIs
4. **Alignment with verticals real requirements**, so we need to provide enough 5G site KPIs information to create real KPIs for verticals
5. **Disseminate which 5G-KPIs** are relevant for our industries and potentially contribute to standardization bodies (e.g. ITU-T)
6. Other Use Cases can take a **similar approach**



KPI Design Principles (from ITU-T SCCs)

- **Comprehensiveness:** The set of indicators should cover all the aspects of the UC.
- **Availability:** The KPIs should be quantitative and the historic and current data should either be available or easy to collect.
- **Independence:** The KPIs in the same dimension should be independent or almost-orthogonal i.e., overlap of the KPIs should be avoided as much as possible.
- **Simplicity:** The concept of each indicator should be simple and easy to understand for stakeholders and third-parties.
- **Timeliness:** This refers to the ability to produce KPIs with respect to emerging issues.



Review of WP1 strategy: T1.3 ITU-T KPIs

Alignment with ITU-T KPIs concept, steps to generate KPIs, so must be supported in our KPI collection framework:

1. **DC - Data collection:** select suitable data sources and data collections for each indicator
2. **DN - Data normalization:** transform all the raw data into a normalized value for each indicator
3. **DAGG - Data aggregation:** aggregate the normalized value of each indicator for each dimension
4. **DASS - Data assessment:** assess the result of all the dimensions for the final index
5. **VE - Verticals evaluation:** draw the conclusion from the vertical industries



5G KPIs: Recording and Accounting

Test recording result = (Test + Scenario + Results files):

1. Test to execute (*Vertical*):

- Play a 4K video during 5 minutes in HLS in a Samsung S9 with the native player at 20 Mbps, segmented in 6 seconds chunks

2. Scenario (*5G*):

- 3.5 GHz band, allocation of 100 MHz, user device located in optimum conditions, not moving device ...

3. Measurements (*KPIs*)

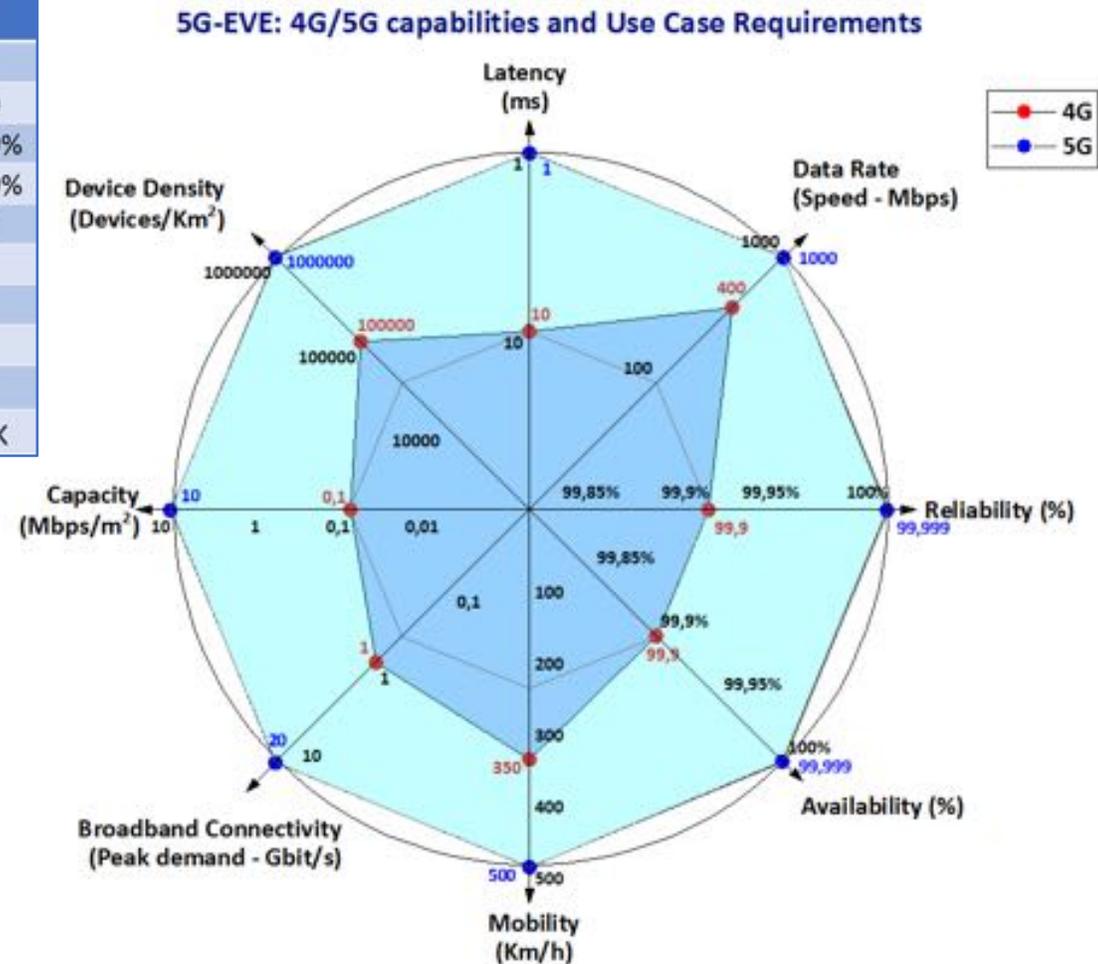
- Multiple execution results files: timestamp, measure 1, measure 2, measure 3...
- Vertical and 5G measurements
- Frequency and precision of results maybe a vertical requirement



Radar chart Visualization for 4G/5G capabilities

General 4G/5G capabilities		Units	4G	5G
1	Latency (in milliseconds)	msec	10	1
2	Speed (in Mbps) - bitrate	Mbps	400	1000
3	Reliability (%)	%	99,9%	99,999%
4	Availability (%)	%	99,9%	99,999%
5	Mobility (in m/sec or Km/h)	Km/s	300	500
6	Broadband Connectivity (peak demand)	Gbps	1	20
7	Network Slicing (Y/N)	Y/N	N	Y
8	Security (Y/N)	Y/N	Y	Y
9	Capacity (Mbps/m ² or Km ²)	Mbps/m ²	0,1	10
10	Device Density	Dev/Km ²	100K	1000K

- *This is the first radar chart which corresponds to a comparison of 4G/5G capabilities.*
- *It was subsequently used as a reference since all the Use Case Requirements was mapped on this one to access their existing and future needs.*



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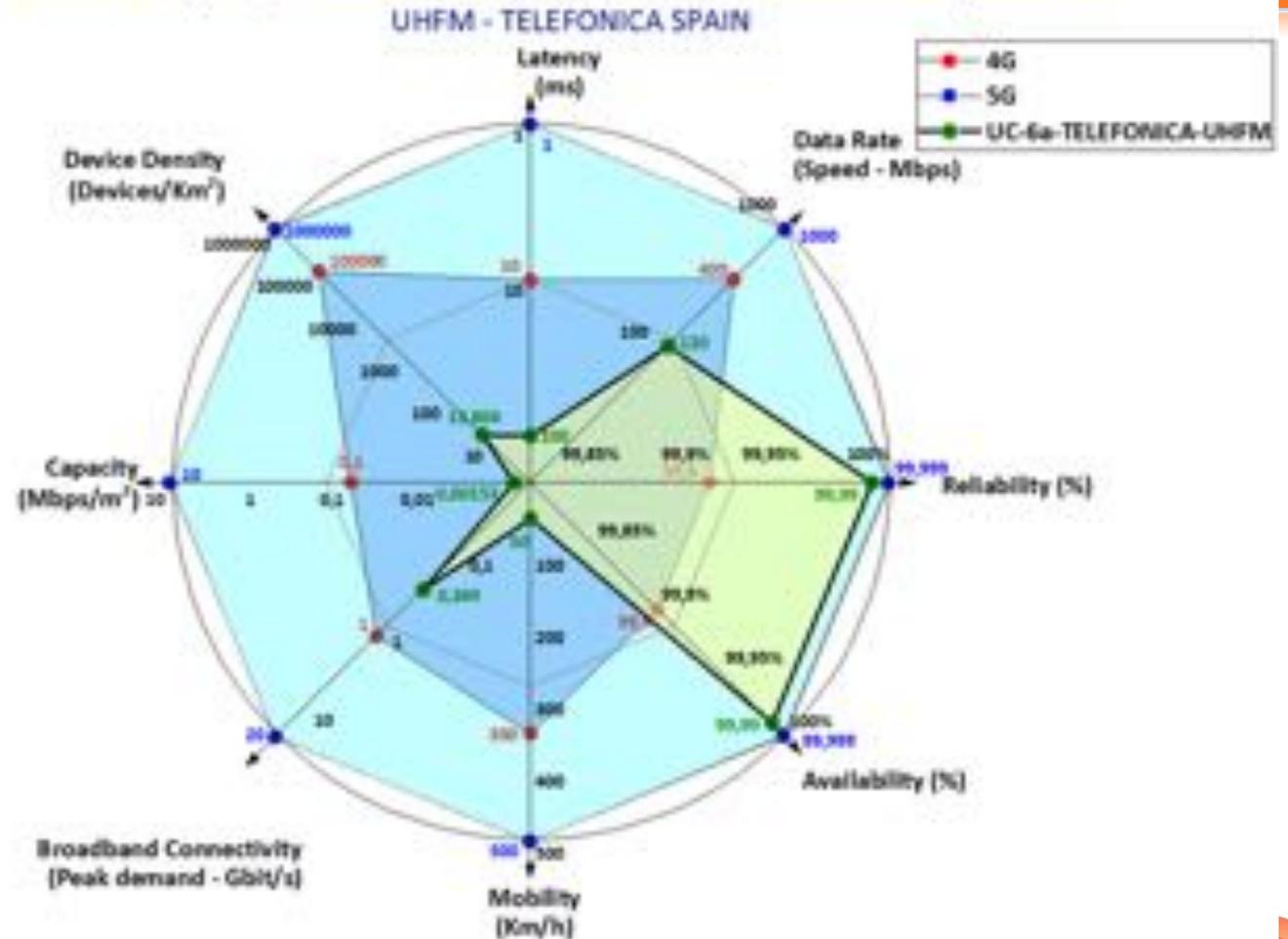
5G EVE

Media & Entertainment KPIs for Telefonica TV services

Collection Framework:

- The 5G end to end facility services will be monitored in order to validate the KPIs and the targeted service level agreements required by vertical industries. **The KPIs collection framework will be described as a high-level architecture view in this task** in order to establish the inputs for WP5 activities.
- The proposed framework will include a **high-level methodology description to collect all the data set from all site facilities (tests results, logs, events), in order to generate and correlate different experiments in a friendly way**, being able to generate gracefully aggregated information for different experiments, including charts generation for advanced graphical KPI correlations under different network configuration and network congestion simulations, if required by the vertical industries.

5G-EVE: 4G/5G capabilities and Use Case 6a Media & Entertainment Requirements



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Vertical KPIs: Media & Entertainment

Test recording result = (Test + Scenario + Results files):

1. In 5G scenarios we have the 5G KPIs measures
2. Which are the KPIs that we should guarantee in Multimedia?
 1. Requirements identified by Verticals, in this case Telefonica
 2. Requirements from external assessors / experts (e.g. VQEG)
3. Open for collaboration
 1. Develop KPIs and KPI measurement methodology
 2. Conduct tests on 5G pilot infrastructure
 3. Contribute to standardization activities (e.g. ITU-T)





Thank you!



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