

# 5G-PPP TMV

## KPIs Measurement Tools

From KPI definition to KPI validation enablement

*“You have to know the past to understand the present.”*

Carl Sagan (2011). “Cosmos”, p.62,  
Ballantine Books

# Objective

- Collect Key Performance Indicator (KPI) definitions utilized in the ICT-17, ICT-19, ICT-52 projects
- Collect the tools utilized to measure such KPIs

- 5G KPIs
- Measurement and Experiment Description
- Available Tools
- Data Collection Platforms
- Visualization Tools

# Measurement and Experiment Description

- Start from KPIs defined by 5GPPP TMV
- Collect KPIs utilised by participating projects
- Definition consolidation

KPI Name	KPI Description	Units
Maximum Expected Latency	RTT of UE IP packets transmitted to the N6 interface. (TMV White paper)	
End-to-end Latency	Aggregation of one-way time delays measured between specific components of the logical architecture of the use case.	ms
End-to-End Latency	Measured round trip time (RTT) from the moment the IP ICMP Echo Request packet leaves the source host until the IP ICMP Echo Reply is received from the destination host.	ms

# Measurement and Experiment Description

- Standardized ways of creating the experimental context around the measurement
  - Especially for large scale 5G use cases
- Example: Testing Scenario Template (TST)
  - The TST contains per slice information such as:
    - the network configuration (both in RAN and Core)
    - the UE capabilities
    - the service characteristics
    - the environmental details in which the tests are executed
    - the metrics and KPIs to be collected and validated
- Other metadata schema available

Parameter group	Test scenarios parameter	Example value
3GPP standard	3GPP Release	Rel.15
	3GPP Architecture option	NSA
RAN	Band	3.5 Ghz
	Bandwidth	50 MHz
	Carrier aggregation	16
	UL/DL pattern	FDD
	Modulation	64QAM
	MIMO	2 layers
Core	Deployment	Edge/Central
UE	Category	CAT 7
	MIMO	2 layers
Service	Deployment	Edge/Central
	Service type	eMBB/URLLC/mMTC
	Indoor/Outdoor	Indoor
	Number of UEs	10

- Which tools have been used to measure which KPIs and how
- Open source
  - For example: ping, iperf, bmon, netem, ostinato
- Proprietary
  - For example: CyPerf, BreakPoint Security IxNetwork, IxLoad, LoadCore
- Software tools
- Hardware tools

- Data collection platforms utilized in the participating projects
  - Prometheus node exporter
    - exposes to the Prometheus server hardware and OS metrics
  - Prometheus Blackbox exporter
    - enables the possibility to probe endpoints over HTTP, HTTPS, DNS, TCP, and ICMP
  - ELK stack
    - for measuring application related KPIs
- Other tools: Telegraf, OML, Librato, FleuntD



- Visualization Tools
  - Important for real-time KPI visualisation
- Examples
  - **Grafana** is a data visualization and monitoring tool with support for many different storage backends for your time series data
  - **Graphite** is a free open-source software tool that monitors and graphs numeric time-series data
  - **Tableau Public** is a free service that lets anyone publish interactive data visualizations to the web.

- White paper on 5G Tools provides an overview of the tools used to measure KPIs in 5GPPP projects related to 5G
- Aims at highlighting the tool capabilities
- Provides some examples of measurements
- Paves the way to seek new or improve current tools for measuring 6G KPIs

Thanks