Automated 5G Performance Validation Testing Solution for Lab Networks

Scalable · Multiple Test Cases · Consistency Testing

DingLicom

Organization

Nokia Bell Labs Shanghai

Overview

ANokia Bell Labs Shanghai is one of the key Nokia R&D sites. The research activities in this location encompass mobile networks, optical access, compute and network convergence, artificial intelligence and machine learning, industrial automation with smart perception, and multi agent intelligent system.

Nokia Bell Labs Shanghai plays a unique role in building Nokia's research ecosystem in China.

Requirements

Nokia Bell Labs requires automated performance validation testing of their 5G devices, base stations, and O-RAN network equipment in a laboratory environment during R&D and before product launch updates.

To evaluate the performance of 5G devices and base stations, it needs to conduct multiple test cases with diversity, scalability, and consistency at maximum efficiency.

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Solution

Dingli Pilot Performer is an effective validating tool for 5G devices and base station equipment. It offers a tailored performance validation testing solution that enables automation of the entire workflow and supports multi-band NSA network combinations for multiple test case requirements.

Our solution delivers an expandable and customizable performance validation that enables Nokia Labs to gain insight into 5G device features and selected KPIs- directly improving product quality and achieving efficiency and consistency in testing.
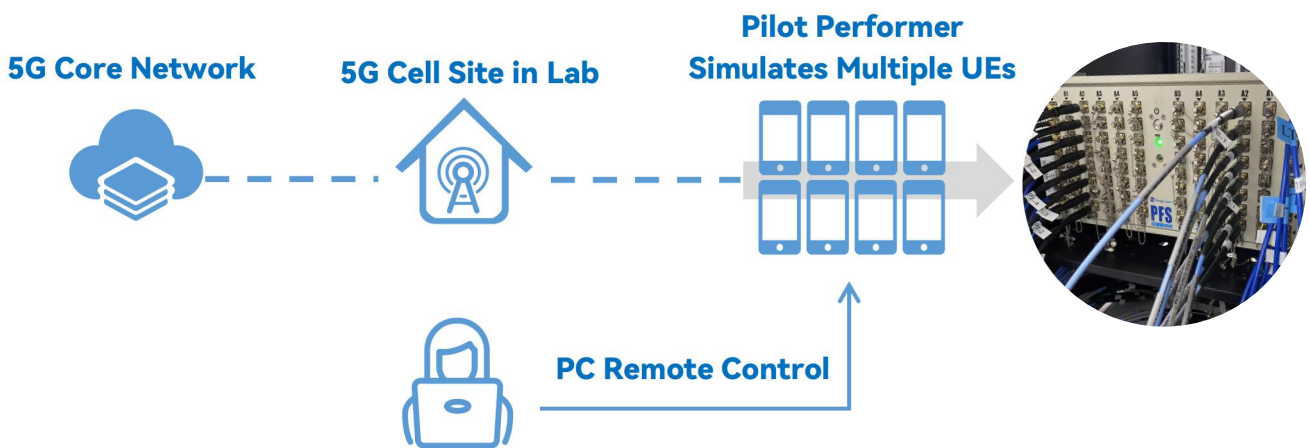
5G Core Network   **5G Cell Site in Lab**   **Pilot Performer Simulates Multiple UEs**

PC Remote Control

Figure 1. Automated remote control laboratory testing solution

UE1	Value	UE2	Value	UE3	Value	UE4	Value	UE5	Value
Network Type	ENDC	Network Type	ENDC	Network Type	ENDC	Network Type	ENDC	Network Type	ENDC
Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100
SSB ARFCN\PCI	512964\292	SSB ARFCN\PCI	512964\227	SSB ARFCN\PCI	512964\227	SSB ARFCN\PCI	512964\227	SSB ARFCN\PCI	512964\227
SS-RSRP\SS-SINR	-93.75\-8.88	SS-RSRP\SS-SINR	-67.62\12.69	SS-RSRP\SS-SINR	-67.62\12.69	SS-RSRP\SS-SINR	-67.62\12.69	SS-RSRP\SS-SINR	-67.62\12.69
Grant Count(DL\UL	349\379	Grant Count(DL\UL	1601\400	Grant Count(DL\UL	1601\400	Grant Count(DL\UL	1601\400	Grant Count(DL\UL	1601\400
Most Rank(DL\UL)	3\1	Most Rank(DL\UL)	4\1	Most Rank(DL\UL)	4\1	Most Rank(DL\UL)	4\1	Most Rank(DL\UL)	4\1
PRB/Slot(DL\UL)	16\256.20	PRB/Slot(DL\UL)	270.45\39.31	PRB/Slot(DL\UL)	270.45\39.31	PRB/Slot(DL\UL)	270.45\39.31	PRB/Slot(DL\UL)	270.45\39.31
Avg MCS(DL\UL)	3.85\24.86	Avg MCS(DL\UL)	21.13\25.07	Avg MCS(DL\UL)	21.13\25.07	Avg MCS(DL\UL)	21.13\25.07	Avg MCS(DL\UL)	21.13\25.07
PD\PU SCH iBLER	0\86.27	PD\PU SCH iBLER	8.74\99.75	PD\PU SCH iBLER	8.74\99.75	PD\PU SCH iBLER	8.74\99.75	PD\PU SCH iBLER	8.74\99.75
Most Modul(DL\UL)	QPSK\256QAM	Most Modul(DL\UL)	256QAM\256QAM	Most Modul(DL\UL)	256QAM\256QAM	Most Modul(DL\UL)	256QAM\256QAM	Most Modul(DL\UL)	256QAM\256QAM
PHY Thr DL\UL(Mb)	2.769\103.178	PHY Thr DL\UL(Mb)	1193.276\17.311	PHY Thr DL\UL(Mb)	1193.276\17.311	PHY Thr DL\UL(Mb)	1193.276\17.311	PHY Thr DL\UL(Mb)	1193.276\17.311
LTE Band\B.Width(	3\20	LTE Band\B.Width(	3\20	LTE Band\B.Width(	3\20	LTE Band\B.Width(	3\20	LTE Band\B.Width(	3\20
EARFCN\PCI	1300\479	EARFCN\PCI	1300\66	EARFCN\PCI	1300\66	EARFCN\PCI	1300\66	EARFCN\PCI	1300\66
RSRP\SINR	-80.75\3.50	RSRP\SINR	-51.87\11.25	RSRP\SINR	-51.87\11.25	RSRP\SINR	-51.87\11.25	RSRP\SINR	-51.87\11.25
PHY Thr DL\UL(Mb)	0.000\0.023	PHY Thr DL\UL(Mb)	0.001\0.003	PHY Thr DL\UL(Mb)	0.001\0.003	PHY Thr DL\UL(Mb)	0.001\0.003	PHY Thr DL\UL(Mb)	0.001\0.003
UE6	Value	UE7	Value	UE8	Value	UE9	Value	UE10	Value
Network Type	ENDC	Network Type	ENDC	Network Type	NR	Network Type	ENDC	Network Type	ENDC
Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100	Band\B.Width(MHz)	41\100
SSB ARFCN\PCI	512964\227	SSB ARFCN\PCI	512964\227	SSB ARFCN\PCI	504990\751	SSB ARFCN\PCI	512964\227	SSB ARFCN\PCI	512964\227
SS-RSRP\SS-SINR	-67.62\12.69	SS-RSRP\SS-SINR	-67.62\12.69	SS-RSRP\SS-SINR	-91.63\6.94	SS-RSRP\SS-SINR	-67.62\12.69	SS-RSRP\SS-SINR	-67.62\12.69
Grant Count(DL\UL	1601\400	Grant Count(DL\UL	1601\400	Grant Count(DL\UL	1600\213	Grant Count(DL\UL	1601\400	Grant Count(DL\UL	1601\400
Most Rank(DL\UL)	4\1	Most Rank(DL\UL)	4\1	Most Rank(DL\UL)	4\2	Most Rank(DL\UL)	4\1	Most Rank(DL\UL)	4\1
PRB/Slot(DL\UL)	270.45\39.31	PRB/Slot(DL\UL)	270.45\39.31	PRB/Slot(DL\UL)	250.83\31.33	PRB/Slot(DL\UL)	270.45\39.31	PRB/Slot(DL\UL)	270.45\39.31
Avg MCS(DL\UL)	21.13\25.07	Avg MCS(DL\UL)	21.13\25.07	Avg MCS(DL\UL)	20.43\25.85	Avg MCS(DL\UL)	21.13\25.07	Avg MCS(DL\UL)	21.13\25.07
PD\PU SCH iBLER	8.74\99.75	PD\PU SCH iBLER	8.74\99.75	PD\PU SCH iBLER	12\7.51	PD\PU SCH iBLER	8.74\99.75	PD\PU SCH iBLER	8.74\99.75
Most Modul(DL\UL)	256QAM\256QAM	Most Modul(DL\UL)	256QAM\256QAM	Most Modul(DL\UL)	64QAM\64QAM	Most Modul(DL\UL)	256QAM\256QAM	Most Modul(DL\UL)	256QAM\256QAM
PHY Thr DL\UL(Mb)	1193.276\17.311	PHY Thr DL\UL(Mb)	1193.276\17.311	PHY Thr DL\UL(Mb)	1034.073\9.666	PHY Thr DL\UL(Mb)	1193.276\17.311	PHY Thr DL\UL(Mb)	1193.276\17.311
LTE Band\B.Width(	3\20	LTE Band\B.Width(	3\20	LTE Band\B.Width(		LTE Band\B.Width(	3\20	LTE Band\B.Width(	3\20
EARFCN\PCI	1300\66	EARFCN\PCI	1300\66	EARFCN\PCI		EARFCN\PCI	1300\66	EARFCN\PCI	1300\66
RSRP\SINR	-51.87\11.25	RSRP\SINR	-51.87\11.25	RSRP\SINR		RSRP\SINR	-51.87\11.25	RSRP\SINR	-51.87\11.25
PHY Thr DL\UL(Mb)	0.001\0.003	PHY Thr DL\UL(Mb)	0.001\0.003	PHY Thr DL\UL(Mb)		PHY Thr DL\UL(Mb)	0.001\0.003	PHY Thr DL\UL(Mb)	0.001\0.003

Figure 2. Screen capture of 10 terminals conduct iPerf test simultaneously

Result

Achieve Maximum Efficiency

Effectively reduce the amount of manual work needed in the testing process and minimize the risk of human error with high-volume testing and repeatability.

Enable Performance Validation of Complex Scenario Testing

Offers customizable and expandable testing solution to provide our customer the flexibility to test use cases on-demand, maximize both their engineering productivity and utilization of test assets.

Objective, Consistent and Seamless Performance Validation

A powerful testing solution capable of emulating 5G Networks, and multiple end-user devices and applications, from test plan definition and execution to reporting and analytics, all in a single user interface.

Testimonials

" We were impressed with Dingli's ability and their expertise.
Our work with Dingli has delivered an automated and scalable performance validation solution, the accuracy and efficiency are the vital factor that we keep partner with them. "

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