GTI Ad Hoc Seminar 2012

TD-LTE terminal and IoT tests in CATR/MTNet

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CATR and MTNet lab

- **China Academy of Telecom Research (CATR) is the largest independent research organization on telecommunications in China, established in mid-1950s. CATR is the best 3rd-party provider of standardization, consultancy and test services on telecommunications in China.**
- **MTNet is a 3rd-party test lab of CATR, focusing on terminal tests.**
- **CATR/MTNet lab can provide "one-stop" test service to 2G/3G/LTE terminals from regulatory-compulsory, global certification, and operator-authorized tests.**

CATR/MTNet lab: Providing one-stop terminal test service

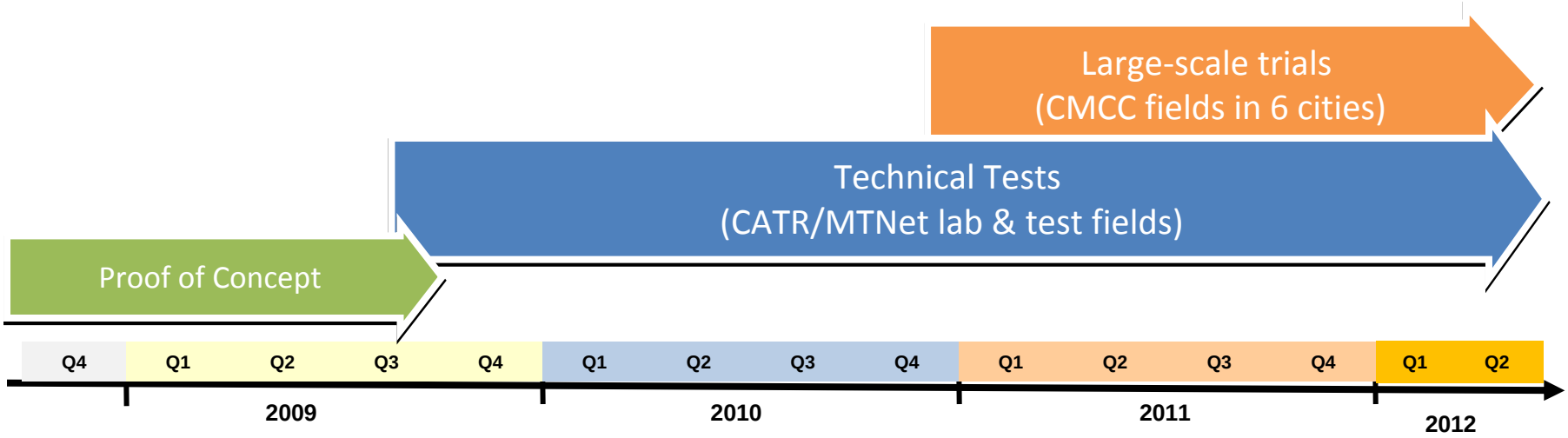
In 2011, we tested 4,700 terminals (3,700 GSM + 1000 3G).

Types of tests	Bodies in charge	Test facilities	Contents	CATR/MTNet lab own following certificates:
Type 1: Compulsory requirements	CE、FCC	3rd party labs	Safety and EMC	CE/FCC certification
Type 2: Certification bodies	GCF、CCF	Authorized labs	RF/Protocol/application conformance, iRAT performance	GCF/CCF authorized lab
Type 3: Regional certifications	CTIA、PTCRB、OMH	Authorized labs	OTA, Cabled IOT, Batteries, WiFi, Bluetooth	PTCRB lab CTIA authorized lab(CATL)
Type 4: Operator Specific Requirements	Operators	Operator's labs or authorized labs	Field trial, UICC card compatibility, typical phones compatibility,	

MTNet lab get DUAL ISO17025:2005 accredited by CNAS and DAkkS, both of which are ilac-MRA ISO17025 accredit bodies..

CATR/MTNet: Most important 3rd-party lab in TD-LTE test and trials in China

- **China's TD-LTE test and trials are mainly carried out in CATR/MTNet lab and CMCC's test fields.**
  - **Lab tests and small-scale field trials: in MTNet lab (Finished tests for 10 TD-LTE network vendors and 10 LTE terminal/chipsets vendors).**
  - **Large-scale field trials: in CMCC networks in 6 Chinese cities.**
  - **90 technical and test specifications, 2000 test cases have been jointly drafted by CMCC and CATR/MTNet.**
  - **Many operators (Vodafone, ClearWire, DT, DoCoMo, KDDI) ever visited CATR/MTNet.**



CATR/MTNet test-bed: Architecture

Lab test environment

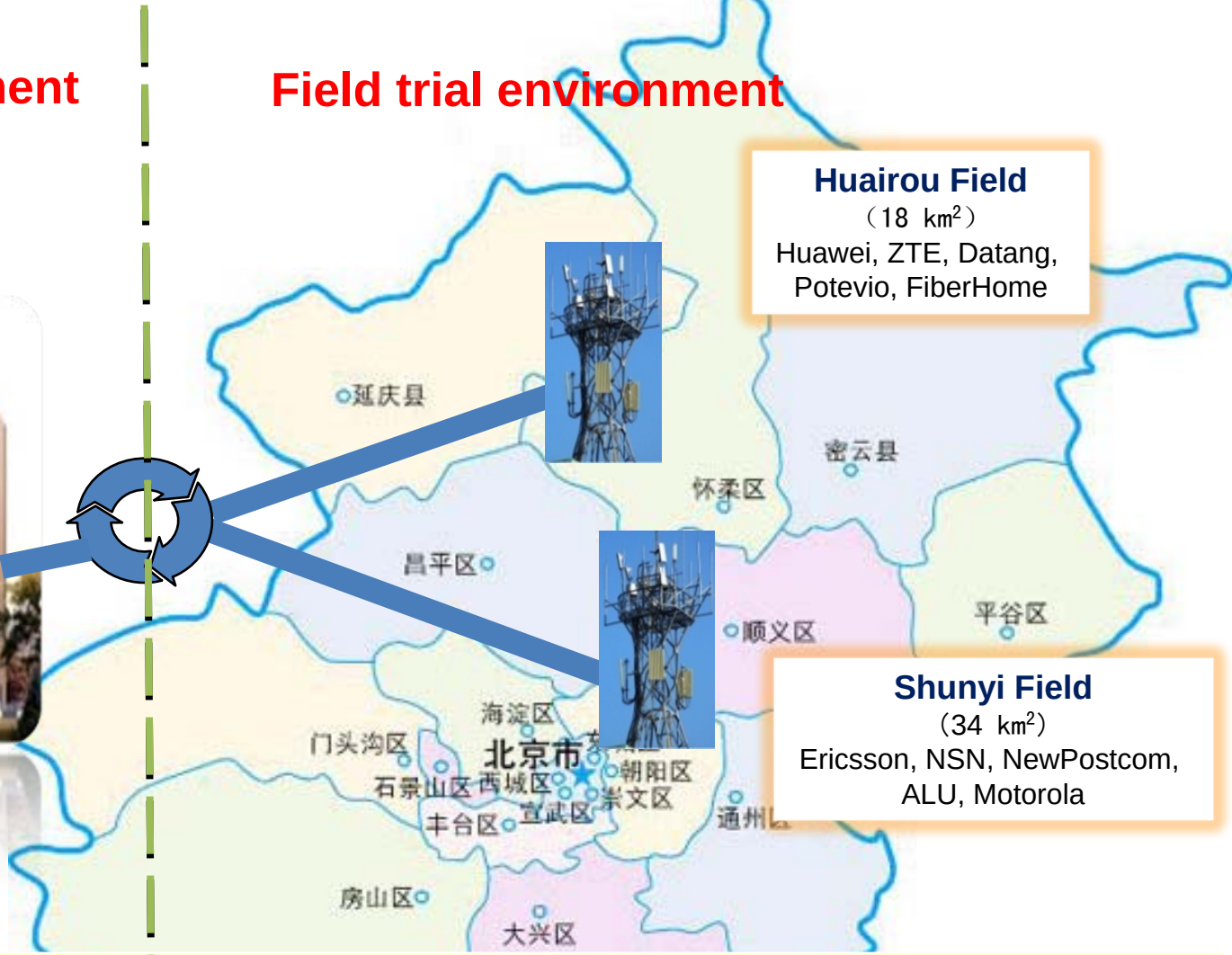
20,000 m^2 building
2 floors, >3000m^2
10 network vendors

MTNet Lab

Field trial environment

Huairou Field
（18 ㎢）
Huawei, ZTE, Datang, Potevio, FiberHome

Shunyi Field
（34 ㎢）
Ericsson, NSN, NewPostcom, ALU, Motorola



Unified lab/field test platform:
Shared core network. 11 network vendors, >80 BSs, 52km^2

CATR/MTNet test-bed: Conformance tests

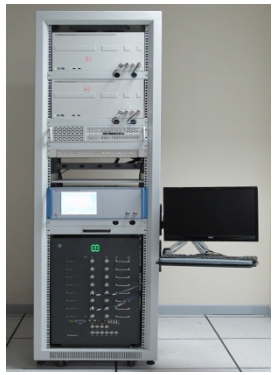
LTE RF&RRM Conformance test platform-R&S TS8980FTA

ROHDE&SCHWARZ

Testing Capability	Mode	Band Supported	Upgrading Plan
LTE RF&RRM(3GPP TS 36.521- 1 , TS 36.521-3)	FDD LTE	FDD1,3,4,7, 12,13,17,20	FDD 2,5,25
	TD-LTE	TDD 38,40	TDD 41,39

RRM Conformance test platform-StarPoint SP8200

星河亮点 StarPoint



Testing Capability	Band Supported	Upgrading Plan
TD-LTE RRM (3GPP TS 36.521-3)	TDD 38,40	TDD 41,39

Anite Conformance Toolset

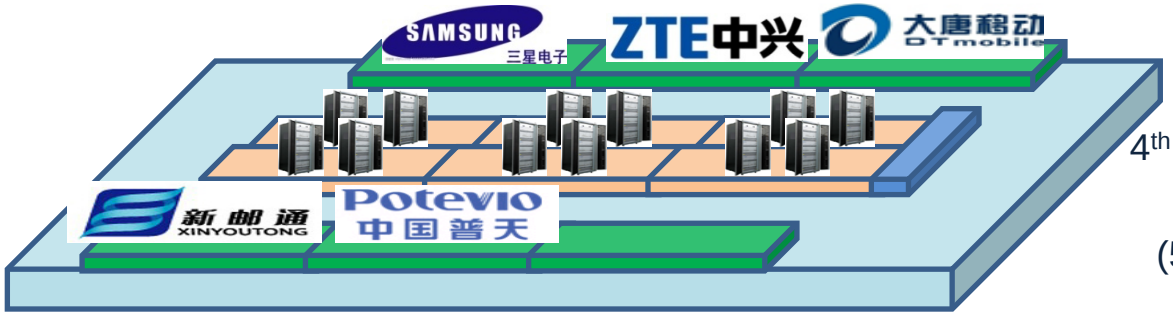
Datang ECT7310

CMW500

The most advanced TD-LTE Protocol platform

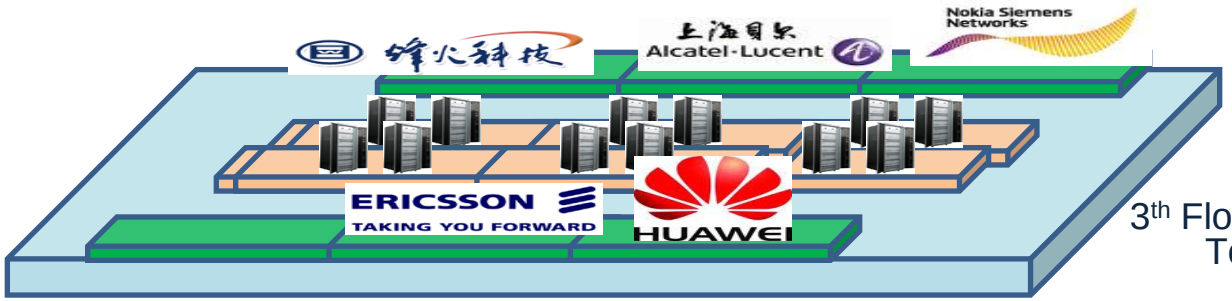
- ✓ Support FDD &TDD
- ✓ Support 3GPP TS36.523-1; Support 3cells&Inter-RAT
- ✓ Support Band1-41

CATR/MTNet test-bed: NW/UE IoT lab



4th Floor of CATR Tower B

(5 companies)



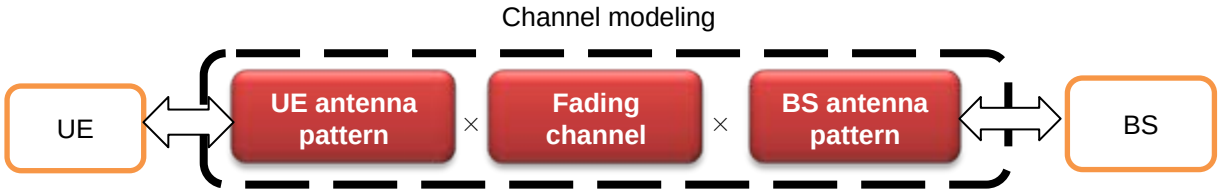
3th Floor of CATR Tower B

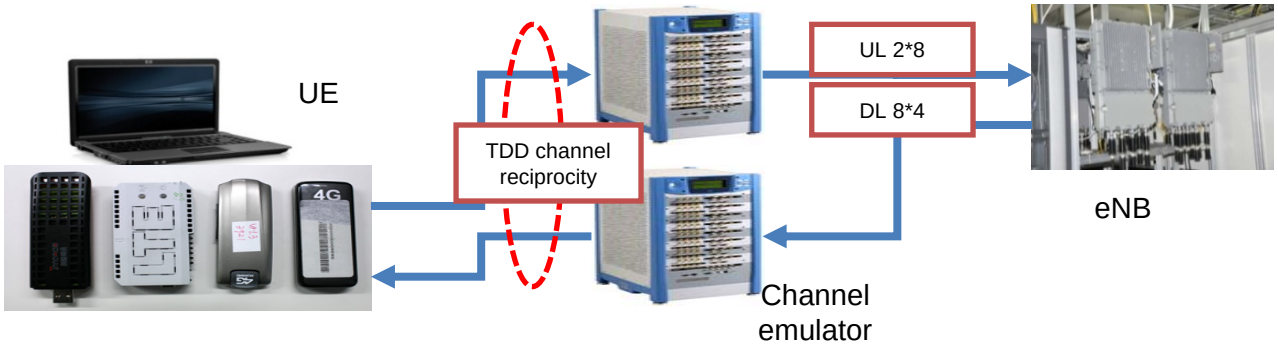
(5 companies)

Test Room

Equipment Room

CATR/MTNet test-bed:
Global-leading 8-ch MIMO test environment

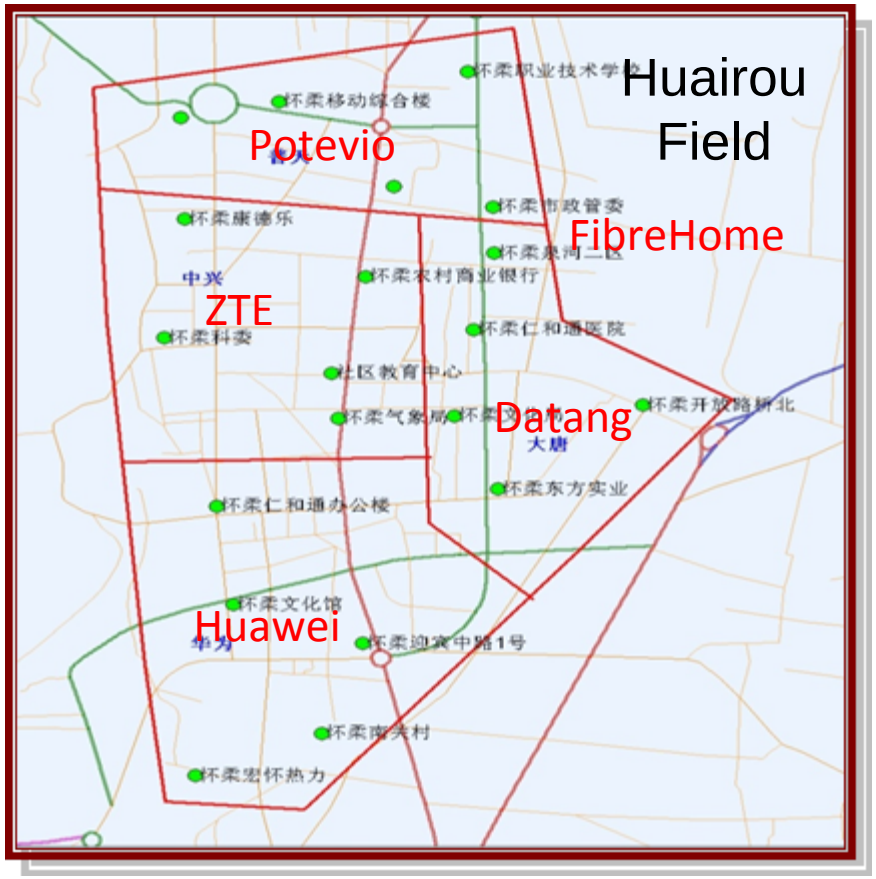


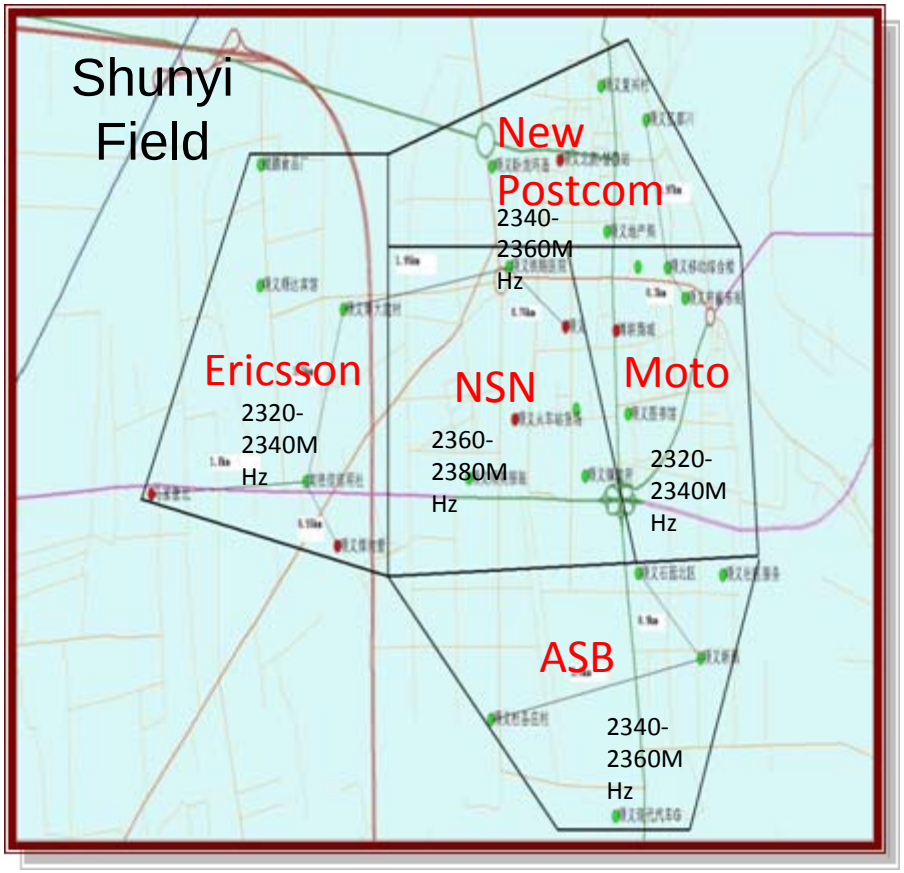


- 8-ch MIMO channel emulation, supporting up to 8*4 antennas.
- Supporting TM2/3/4/7/8, SU-MIMO and MU-MIMO.
- Modeling TDD UL/DL channel.
- Easily evolved for future TM9 and CoMP tests.

CATR/MTNet test-bed: Trial field

- Huairou field: ZTE, Huawei, Datang, Potevio, FiberHome
- Shunyi field: Motorola, NSN, Ericsson, ASB, New Postcom
- 5 BSs/15 cells for each vendor.





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TD-LTE tests & trials in CATR/MTNet

- From technical test to large-scale trial
- From lab test to field test
- From single-mode to multi-mode

Large-scale trials
(CMCC trial fields in 6 cities)

Technical Tests
(CATR/MTNet lab & trial fields)

Proof of Concept

- PHY key tech. verification

- Single-system tests
- Terminal chipset tests
- IoT tests
- Key technology tests
- Networking field tests

- Large-scale networking performance tests.
- Network & terminal tests for commercialization.

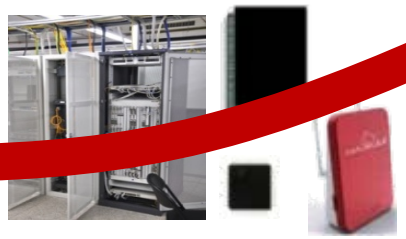
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
		2009				2010				2011				2012

- 90 technical and test specifications, 2000 test cases.

Prototype system & FPGA terminal

Testing system & terminal ASIC

Pre-commercial system & terminal



TD-LTE tests & trials in MTNet: Progress

- **Lab tests and small-scale trials for 10 TD-LTE networks:**
  - **Huawei, ZTE, Ericsson, NSN (Motorola), ALU, Datang, Potevio, NewPostcom, FiberHome, Samsung.**
  - **Including functionality, performance, RF, IoT, key technology verification and networking verification.**
- **Lab tests and small-scale trials for 10 TD-LTE single-mode UE chipsets:**
  - **Hi-Silicon, Innofidei, Qualcomm, Altair, ZTE, Sequans, LeadCore, ST-Ericsson, CYIT, Spreadtrum.**
  - **Including functionality, performance and IoT.**
- **Lab tests and small-scale trials for 34 Uu IoT pairs between 10 networks and 7 UE chipsets:**
- **4 TD-LTE/3G/2G multi-mode UE tested:**
  - **Innofidei (dual-chip), ZTE, LeadCore, Spreadtrum.**
- **ZUC algorithm tests ongoing.**

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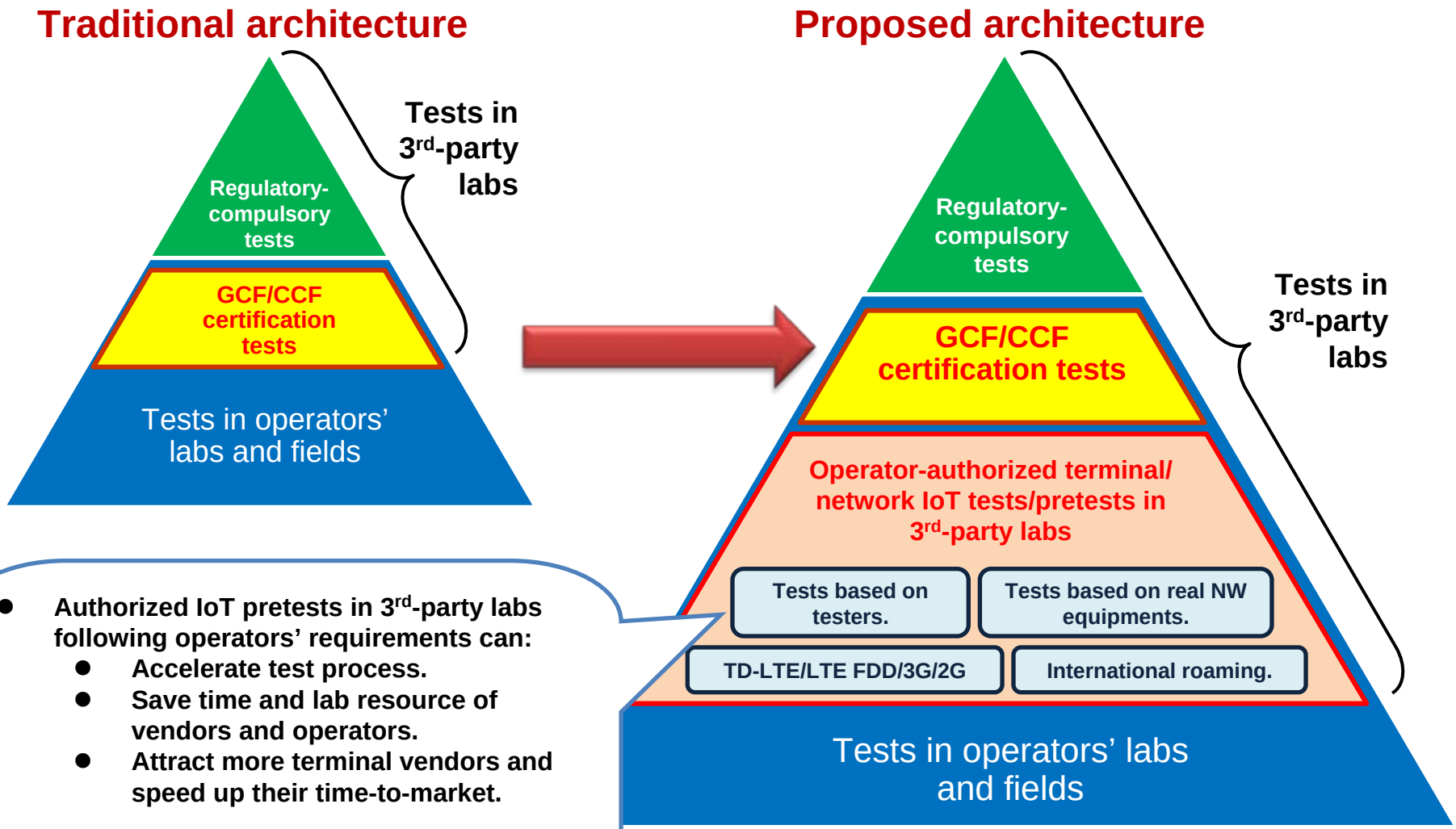
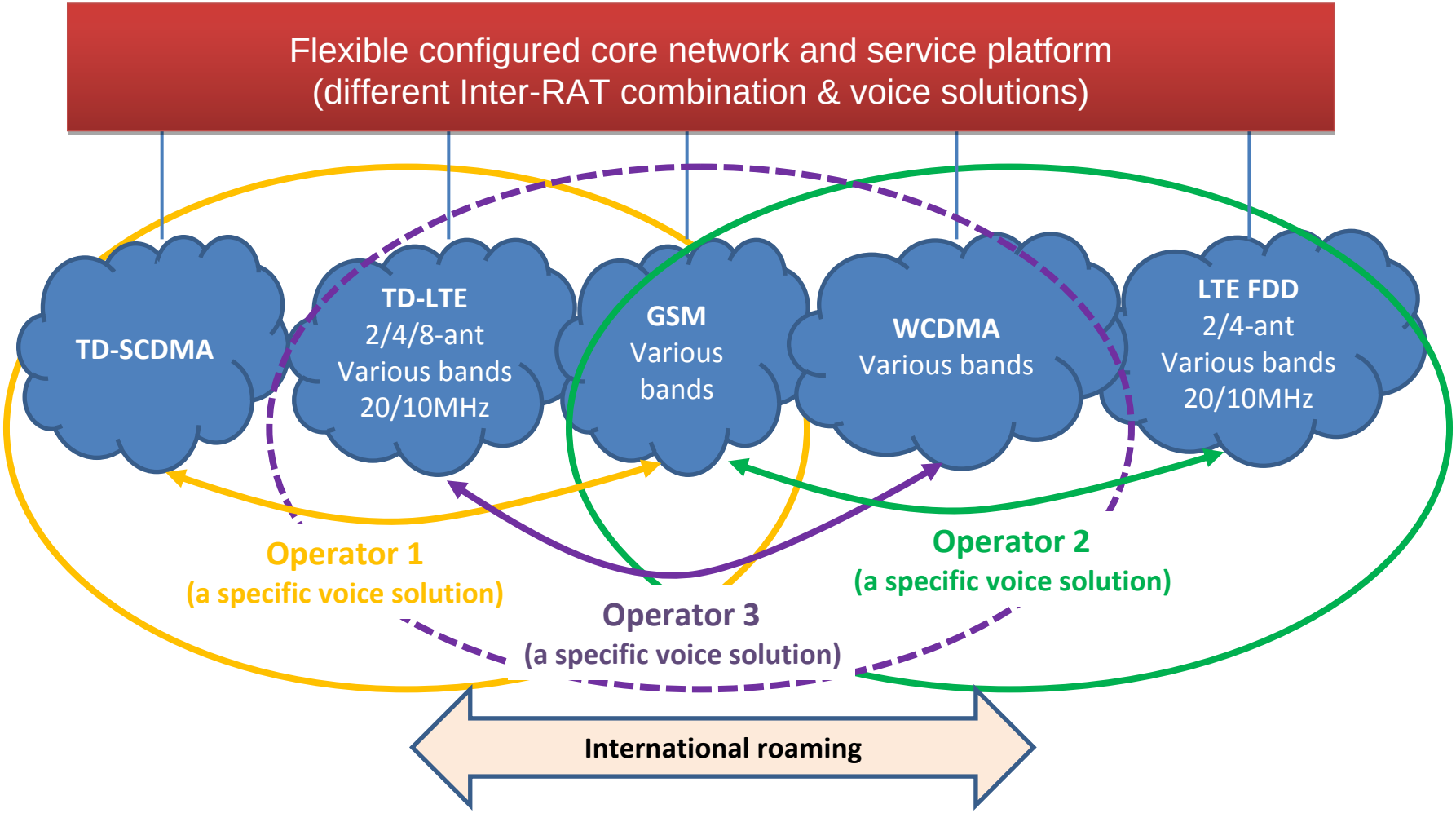
Considerations on services for TD-LTE operators



- **Authorized IoT pretests in 3rd-party labs following operators' requirements can:**
  - **Accelerate test process.**
  - **Save time and lab resource of vendors and operators.**
  - **Attract more terminal vendors and speed up their time-to-market.**
- **CATR/MTNet is a good example of this kind of labs.**

CATR/MTNet multi-RAT test-bed under construction



- 1st dimension: Different LTE configurations: MIMO modes, spectrum, bandwidth.
- 2nd dimension: Different LTE/3G/2G combinations and different voice solutions.
- 3rd dimension: Different types of terminals and different chipset solutions.
- 4th dimension: Roaming scenarios between different operators pairs.

Summary

- **TD-LTE industry is growing fast. However the number and quality of terminals is still the biggest challenge.**
- **Testing is an effective way to promote TD-LTE terminal R&D.**
- **Besides the fundamental conformance tests, the operator-defined IoT tests is an essential part. However it often consumes a huge amount of resource of vendors and operators.**
- **Operator-authorized terminal pre-tests in 3rd-party labs is a good approach to accelerate the R&D and test procedure. This will save time resource and lab resource of vendors and operators, shorten time-to-market, and also attract more terminal vendors' join in.**
- **CATR/MTNet lab has a world-wide unique test-bed including all TD-LTE network vendors' equipments and supporting 2G/3G/LTE multi-RAT.**
- **CATR/MTNet like to collaborate with all operators to promote their TD-LTE terminal R&D by pre-test following operators' requirements.**

Thanks for your attention!

Welcome to visit our world-wide unique test-bed including all TD-LTE vendors' equipments.

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