3GPP TSG RAN meeting #80
La Jolla, USA, June 11 - 14, 2018
Agenda item: 9.1.16

RP-180864

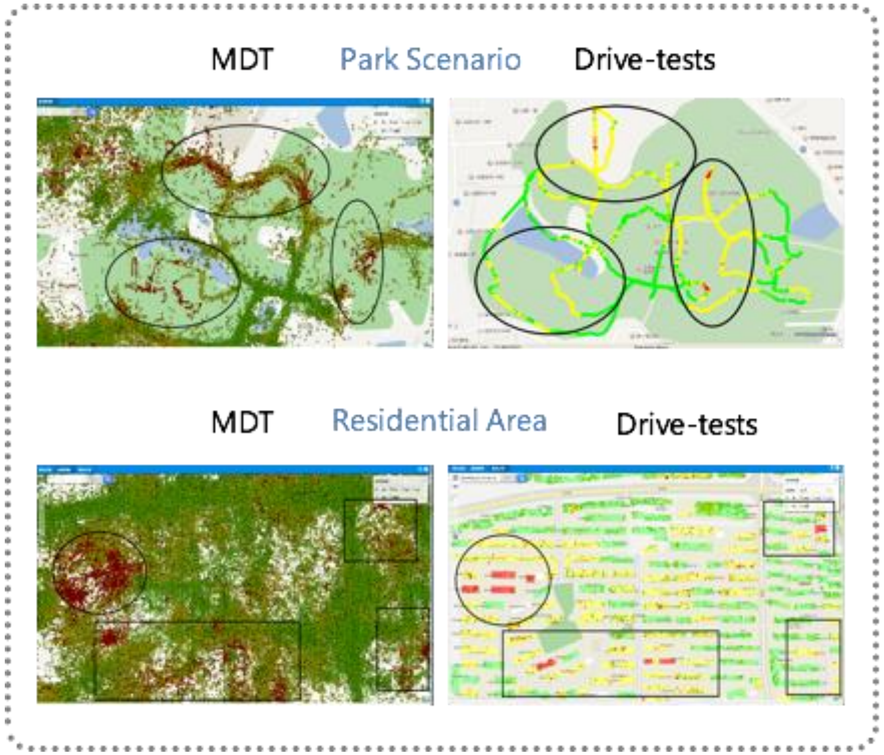
Motivation for SID proposal for RAN-centric Data Collection and Utilization for NR

CMCC

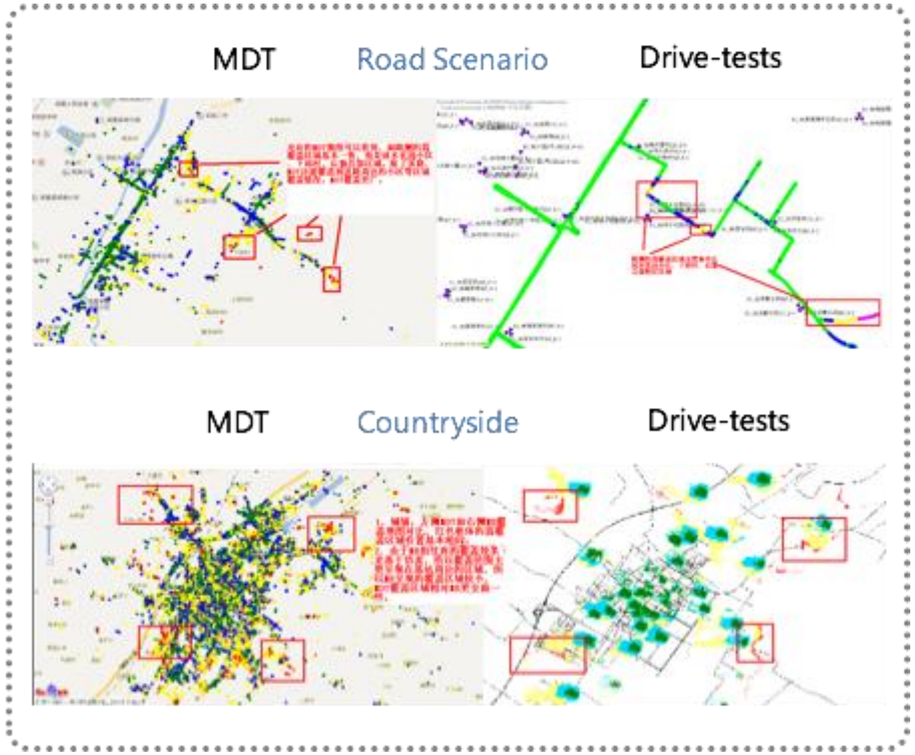
When BigData met LTE

LTE Data Utilization - Coverage Enhancement

MDT-based RAN Data is used to identify and analyze coverage issues, e.g. poor coverage and over shooting



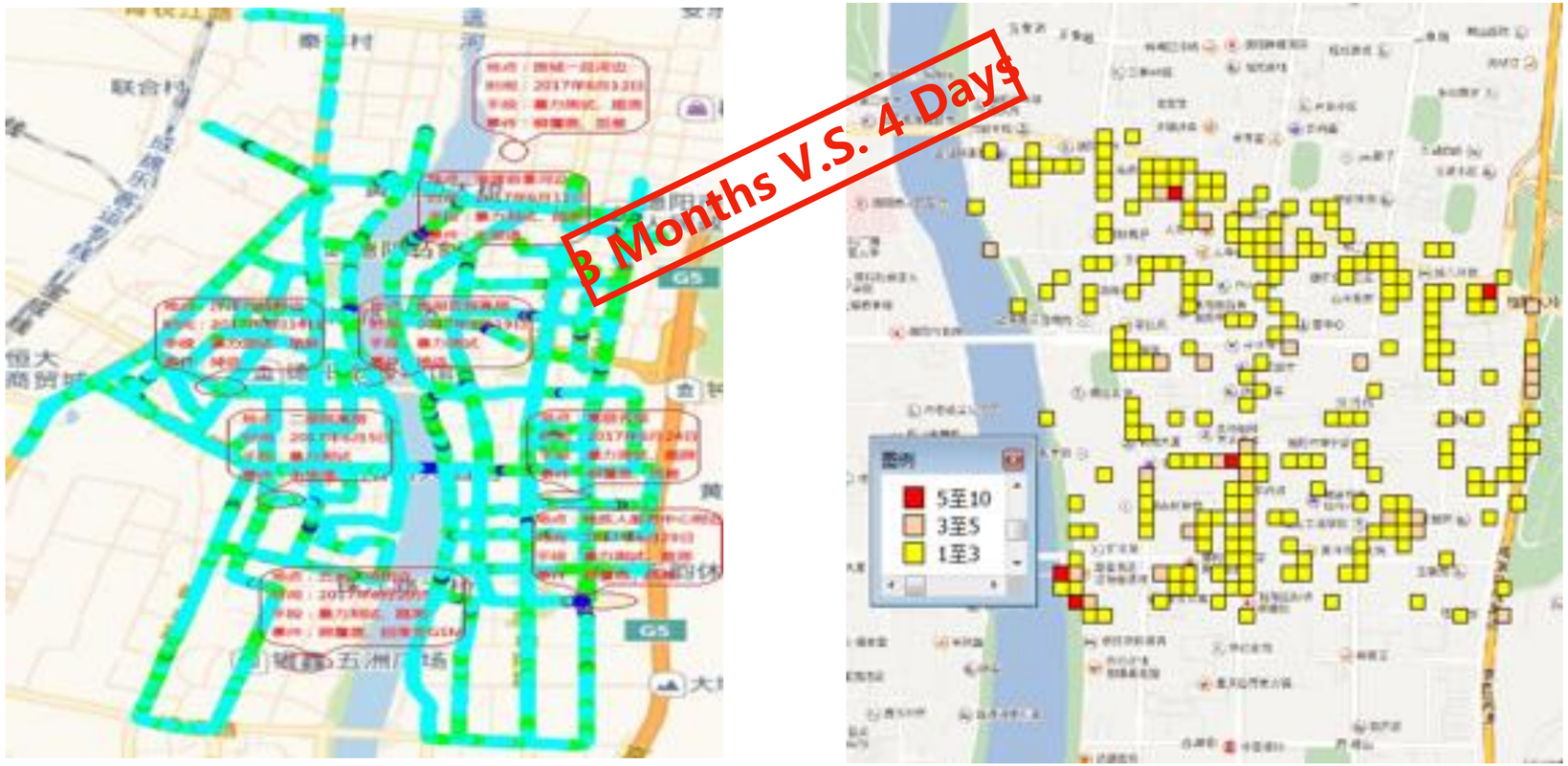
MDT in Jiangxi Province



MDT in Shanxi Province

LTE Data Utilization - Problem Detection

By using traditional drive test, 288 problems were identified in 3 months
By using RLF Report, only 4 days spent and massive RFL reports (1473 per day) collected through MDT
The consistency of the two methods is more than 88%, and obviously MDT is more efficient

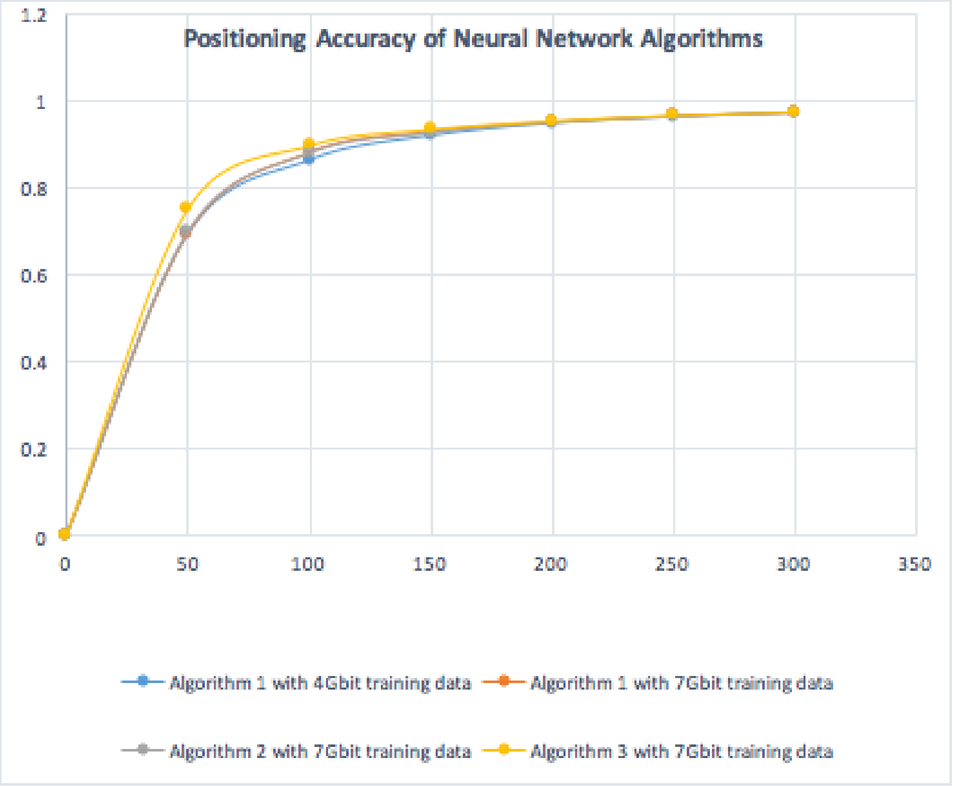


RLF report in Sichuan Province

LTE Data Utilization - Positioning

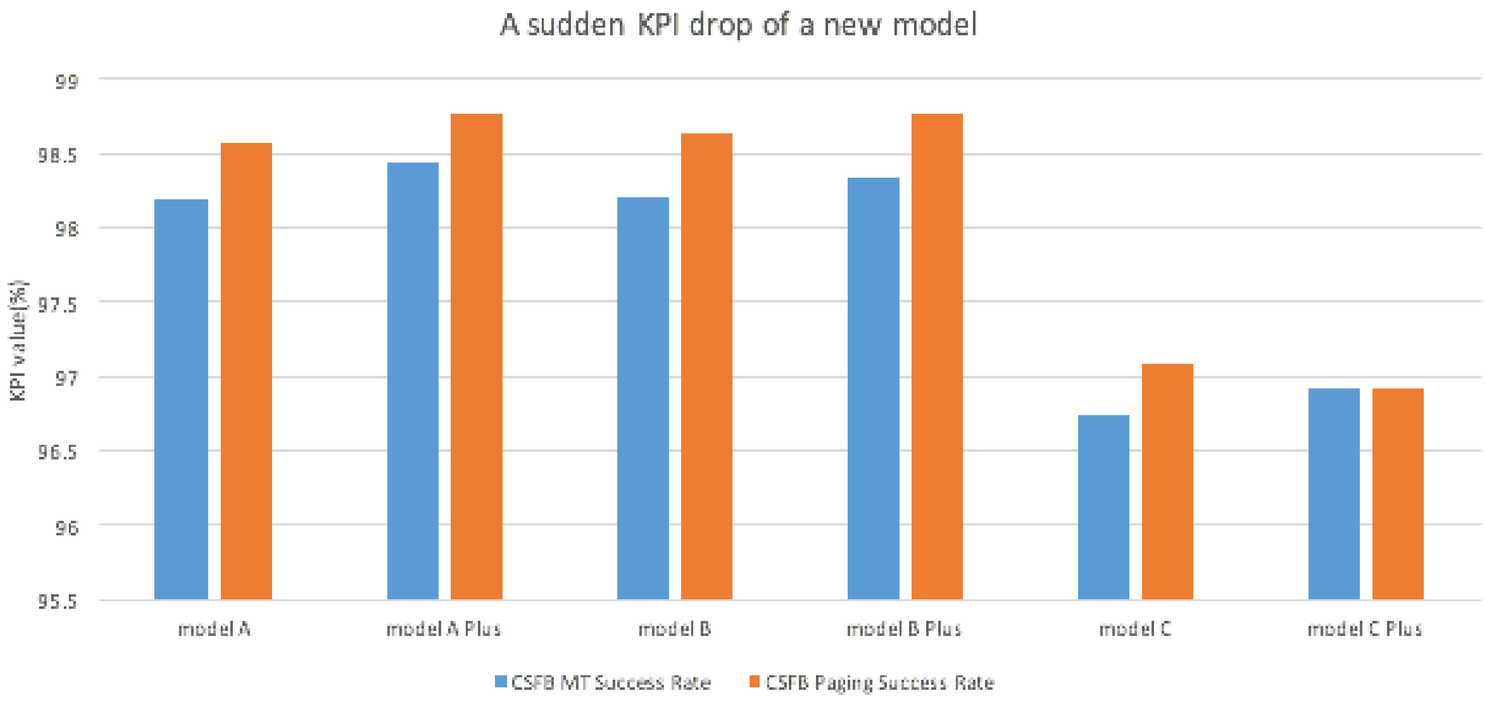
Based on MR Data, the CDF of positioning accuracy within 50m can achieve about 70%
The more Data used, the higher accuracy achieved

Neural Network Algorithms	Algorithm 1 with 4Gbit training data	Algorithm 1 with 7Gbit training data	Algorithm 2 with 7Gbit training data	Algorithm 3 with 7Gbit training data
CDF of positioning accuracy <50m	69.15%	69.55%	69.93%	75.02%
CDF of positioning accuracy <100m	86.12%	88.15%	88.04%	89.58%



Shanghai, about 7 sq.km, with more than 160 base stations and 600 cells

LTE Data Utilization - Performance assessment for terminal models



- **KPI can be associated with terminal models, since terminal models can be differentiated on network side by IMEI**
- **E.g., the sudden KPI drop of a newly launched smart phone is significantly lower than its predecessors**
- **Quick identification of the reason is important for the terminal vendor, network vendors and the operator**

BigData met LTE

- Following advantages are observed and achieved from standard based Data collection and utilization in LTE (i.e. MDT and SON):
  - CAPEX & OPEX of operators significantly reduced, e.g. more accurate base station deployment, much less human resource for drive tests
  - User experience enhanced, e.g. Data based machine learning help proper RRM, Mobility Management and positioning
  - Network planning and optimization becomes more effective and efficient, e.g. coverage enhancement and problem identification

RAN-centric data collection and utilization should be thoroughly studied and investigated in NR

- As in LTE, advantage of Data collection and utilization still valid and attractive
- Further enhancement and improvement will be achieved from lessons of LTE
- New RAN architecture (CU/DU), powerful storage and computing capability of new RAN provide new opportunity for Data collection and utilization

Potential Specification Impact

- **Definition: what/where is Data**
  - From consenting UEs: RRM measurement quantities, RLF, access failure,…
  - From gNBs: L2 measurement quantities, signaling procedure log
- **Collection: how to obtain Data**
  - Logical entity/function to configure and control collection
  - Procedure of data collection (like LTE MDT)
- **Utilization: how to use Data**
  - SON
  - RAN information exposure
  - Edge computing

SID objectives

- Study the use cases and benefits of RAN centric Data utilization, e.g. SON features including mobility optimization (cell and beam based), RACH optimization, load sharing/balancing related optimization, coverage and capacity optimisation, Minimization of Drive testing (MDT), [URLLC optimisation], [V2X], etc., applicable to different scenarios in NG-RAN, MR-DC connected to 5GC and EPC [and LTE] and take NR new features, e.g., beam, network slice, BWP, duplication etc. into account

- Definition: Identify necessary measurement quantities for collection and utilization, including:
    - RRM measurement quantities, RLF and access failure information, etc from consenting UEs,
    - L2 measurement quantities.
    - L1 measurement quantities (e.g. Timing Advance in RAR)
    - Sensor data for UE orientation/altitude to log in addition to location (e.g., digital compass, gyroscope, barometer)

- Collection: Study the procedure for configuration and collection of UE measurements, L1/L2 RAN node measurements and signalling procedure for distributed and central analysis.

- Utilization: Study necessary procedures and information exchange required for different use cases, e.g. SON, RRM enhancement, edge computing, radio network information exposure, [URLLC and V2X], etc

Thank You