



Quality of service experience and challenges in Sudan

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QUALITY OF SERVICE

QoS

USER

THROUGHPUT

MEASURE

ERROR

NETWORK

MECHANISM

APPLICATIONS

SLA

REQUIREMENTS

TRAFFIC

PROTOCOL

BANDWIDTH

PACKETS DELAY

TELECOMMUNICATION

RATES

TELEPHONY

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JITTER

LATENCY

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- What is QoS?

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- Key Performance Indicators

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- Monitoring Methods Adopted by TPRA

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- Obstacles And Challenges

1. What is Quality of Service?

- ▶ Quality of Service (QoS) is the collective effect of service performance which determine the degree of satisfaction of a user of the service and its one of the most important means of supporting the development of the telecommunications sector.
- ▶ QoS is always end-to-end, i.e. user-to-user or user-to-content therefore its depends on the contributions made by user, user equipment, access network, IP transport, core network, and the rest of the path end-to-end .



- ▶ QoS parameters characterize the quality level of the service being offered and the level of customer satisfaction.



- ▶ A target is defined as a potential value (or a range of values) for a parameter that must be reached if quality is to be regarded as satisfactory.

2.



Key Performance Indicators

- ▶ KPIs are indicators that give an information about the network performance or the user experience (eg speed, total traffic, blocking).

- ▶ Properly defined KPIs helps to:

- Network optimization.
- Detect problem locations
- Predict future needs for investments and changes in networks.



□ Voice:

The important KPIs are:

- ▶ **Call Setup Success Rate (CSSR):**

Number of the successful call attempts divided by the total number of call attempts.

- ▶ **Call Drop Rate (CDR)**

A percentage of calls that are disconnected in the middle of the conversation without the user's intervention.

- ▶ **Handover Success Rate / Soft Handover Success Rate :**

The act of transferring support of a mobile call from one base station to another is termed handover or handoff. Handover occurs when a call has to be handed over from one cell to another as the user moves between cells.

- ▶ **SDCCH Congestion Rate** A percentage of failure of accessing a stand-alone dedicated control channel during call set up

- ▶ **Voice Quality**

The overall voice quality rate is equal to the average voice quality on the downlink and uplink which refers to the network's ability in achieving an acceptable level of voice quality using the Mean Opinion Score (MOS) measure.

- ▶etc

❑ Data services :

The important KPIs for File Transfer Protocol (FTP) Download/ Upload , Hyper Text Transfer Protocol (HTTP) are :

▶ PDP Context Activation Failure Ratio [%]

Denotes the probability that the PDP context cannot be activated. It is the ratio of unsuccessful PDP context activation attempts to the total number of PDP context activation attempts.

▶ Setup Time [s]

Denotes the period of time it takes to access a service successfully, from the moment the dial-up connection is established until the first data packet is received.

▶ Mean Data Rate [kbit/s]

Denotes the average data rate measured throughout the entire connect time.

▶etc

3. Monitoring Methods adopted by TPRA

3.1 Drive Test

3.2 Crowdsourcing

3.3 Performance management

3.1 Drive Test

- ▶ Tools used are:
 - ▶ TEMS Investigation
 - ▶ TEMS SYMPHONY
 - ▶ QualiPoc Freerider
 - ▶ TEMS Discovery Professional (analysis tool)
 - ▶ NQDI (analysis tool)

➤ Measurement methodology for Voice:

- ▶ TEMS Investigation is used with 3 handsets for generating calls and other 3 handsets for answering .
- ▶ Two types of calls are generated :long calls(120 seconds) and short call (30 seconds).
- ▶ Tests are made during morning and evening to cover the busy hour.

➤ For data:

▶ FTP Download/Upload:

-TEMS Symphony is used to download(upload) certain files from(to) FTP server, belongs to TPRA, with a size up to 20MB(1MB)

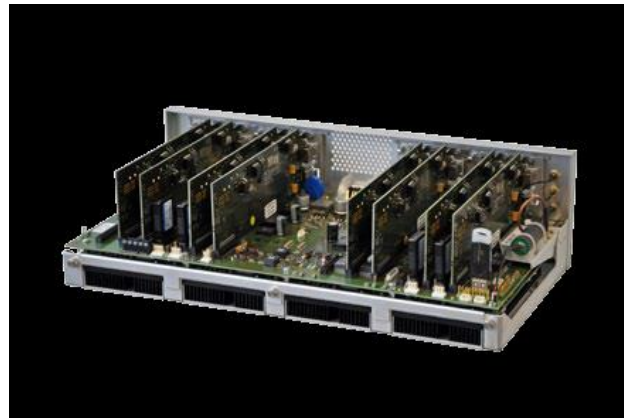
▶ HTTP:

-TEMS Symphony is used to access certain web pages (Google, YouTube , etc) to test HTTP.

▶ Tests are made during morning and evening to cover the busy hour.

► TEMS SYMPHONY WITH MTP-4:

- A single, versatile platform for benchmarking.
- Flexible platform supports multiple device types (including traditional handsets and modems).
- includes 4 processors and 12 channels (Includes 9 channels for voice, 3 channels for data)



► QualiPoc Freerider

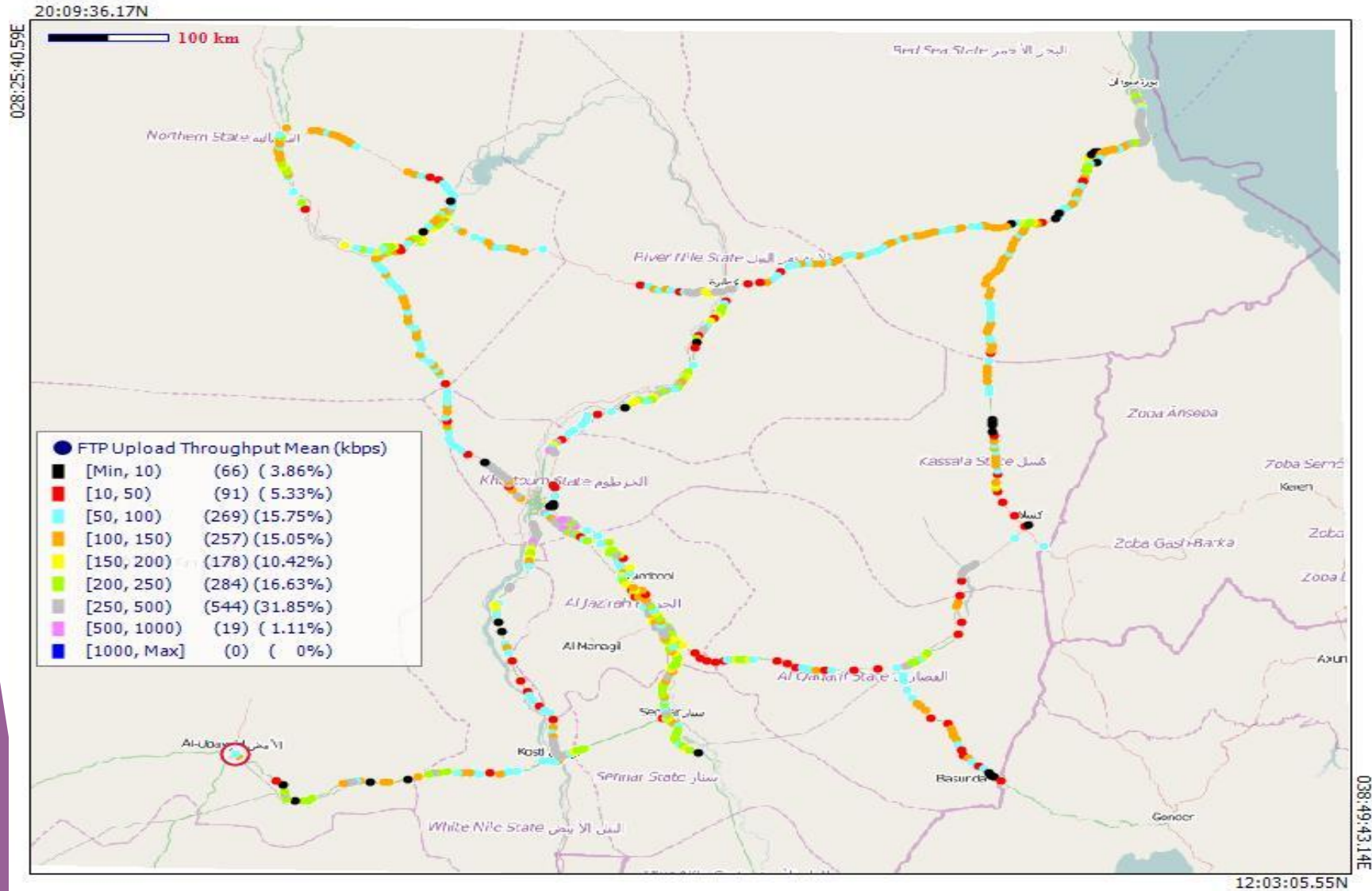
- Freerider Tablet (Master)
- Up to 6 QualiPoc Android smartphones (Slaves)
- Optional
 - Bluetooth/USB/Scanner GPS
 - Scanner(s)
 - Core shell
 - Backpack



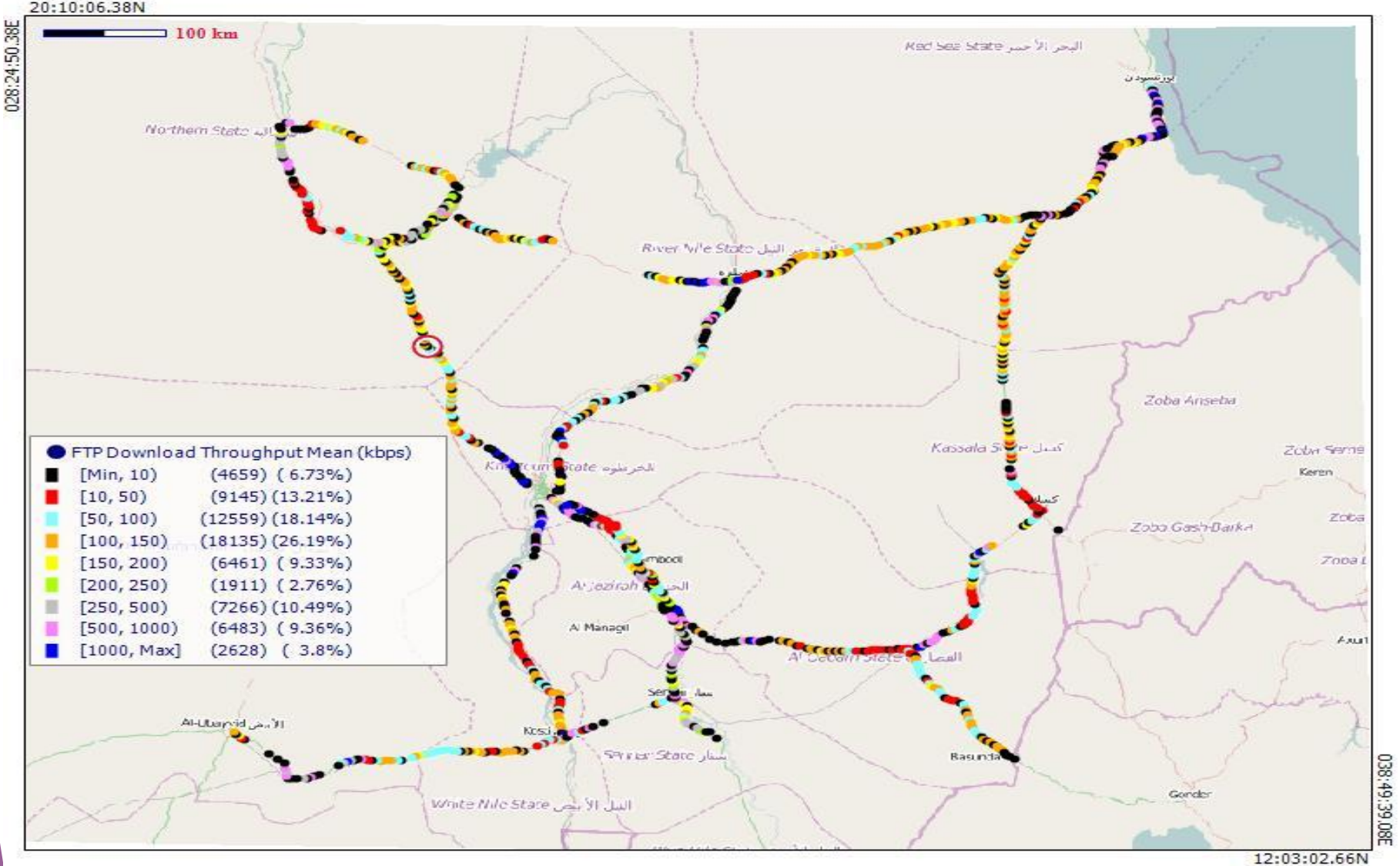
► Well equipped vehicles



8000 Kilometres DT for National Roads (DL)



8000 Kilometres DT for National Roads(UL)

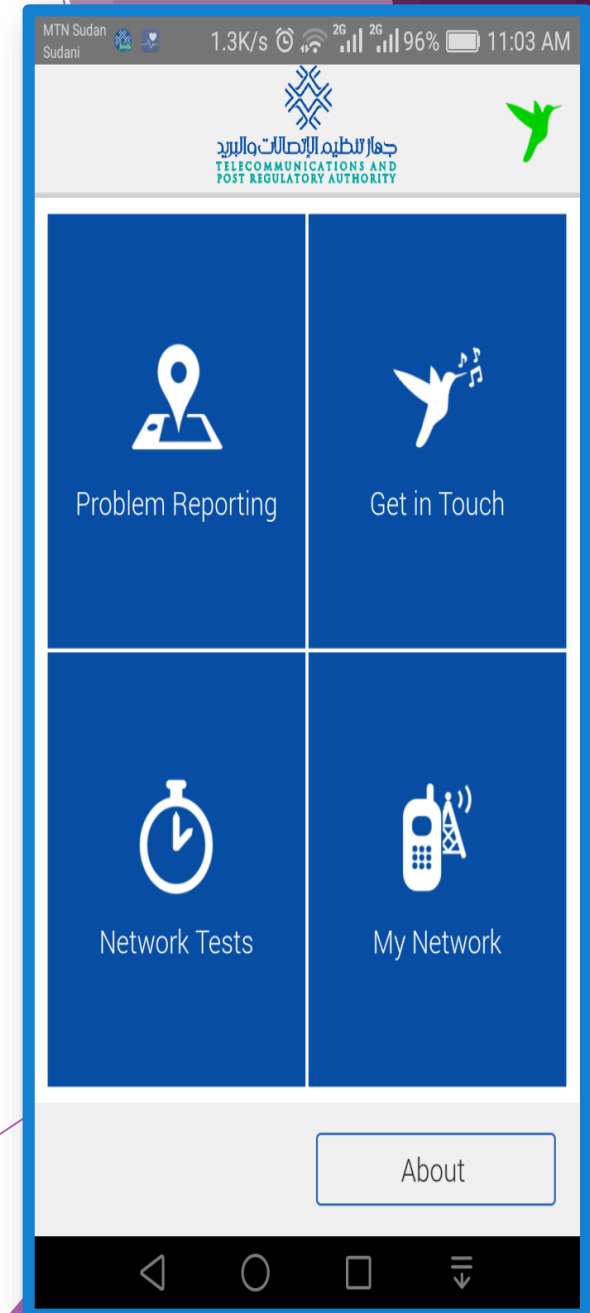


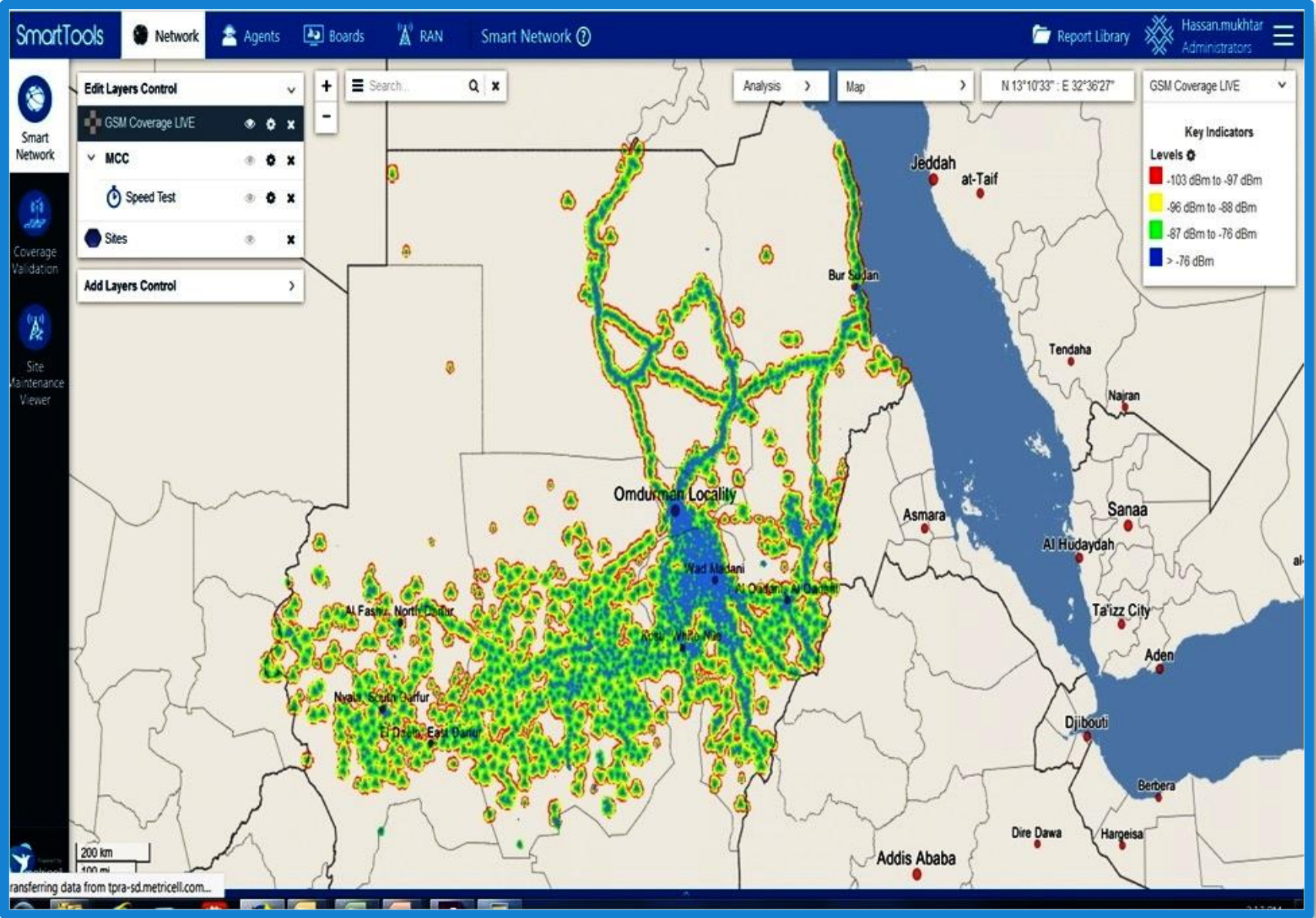
3.2 Crowdsourcing



❖ TPRA Jowda Application

- ▶ Jowda is a mobile experience monitor used to capture the user experience of the network.
- ▶ Its automatically measuring and reporting network performance information.





3.3 Performance Management

- ▶ This is a tracking system for the performance of each network using the predefined KPIs.
- ▶ All the data from OMC counters for Zain, MTN and Sudani networks is imported then, it calculate the predefined KPIs using specific formula for each one, this happen in a daily manner so finally we can get a daily , weekly or monthly report illustrating the exact state for the network.

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Please Choose Your Monitoring Mode

Daily

Weekly

Monthly



4. Obstacles and Challenges

- ▶ DT: logistic and operation
- ▶ PM:
 - operators were refuse in the begging of the project (delay to give the counters and to connect with their OSS)
 - vendors were change the version periodically
- ▶ CEM: deploying the APP

Thank You

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