

MOBITEL'S APPROACH TOWARDS QoS & BENCHMARKING

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MOBILE TELECOM INDUSTRY IN SRI LANKA

- Sri Lanka's telecoms market is relatively small but mature compared to neighboring countries in South East Asia.
- Mobile penetration has risen from 96% in 2012 to 126% in 2017.
- Mobile broadband penetration over the past five years with market penetration increasing from 8% in 2012 to 21% in 2017.
- Moderate growth is predicted over the next five years for Sri Lanka's internet market.
- The market is now moving from 4G towards 5G mobile services.
- Fixed broadband penetration in Sri Lanka remains very low mainly due to the dominance of the mobile platform.
- The availability of e-commerce applications continues to increase.

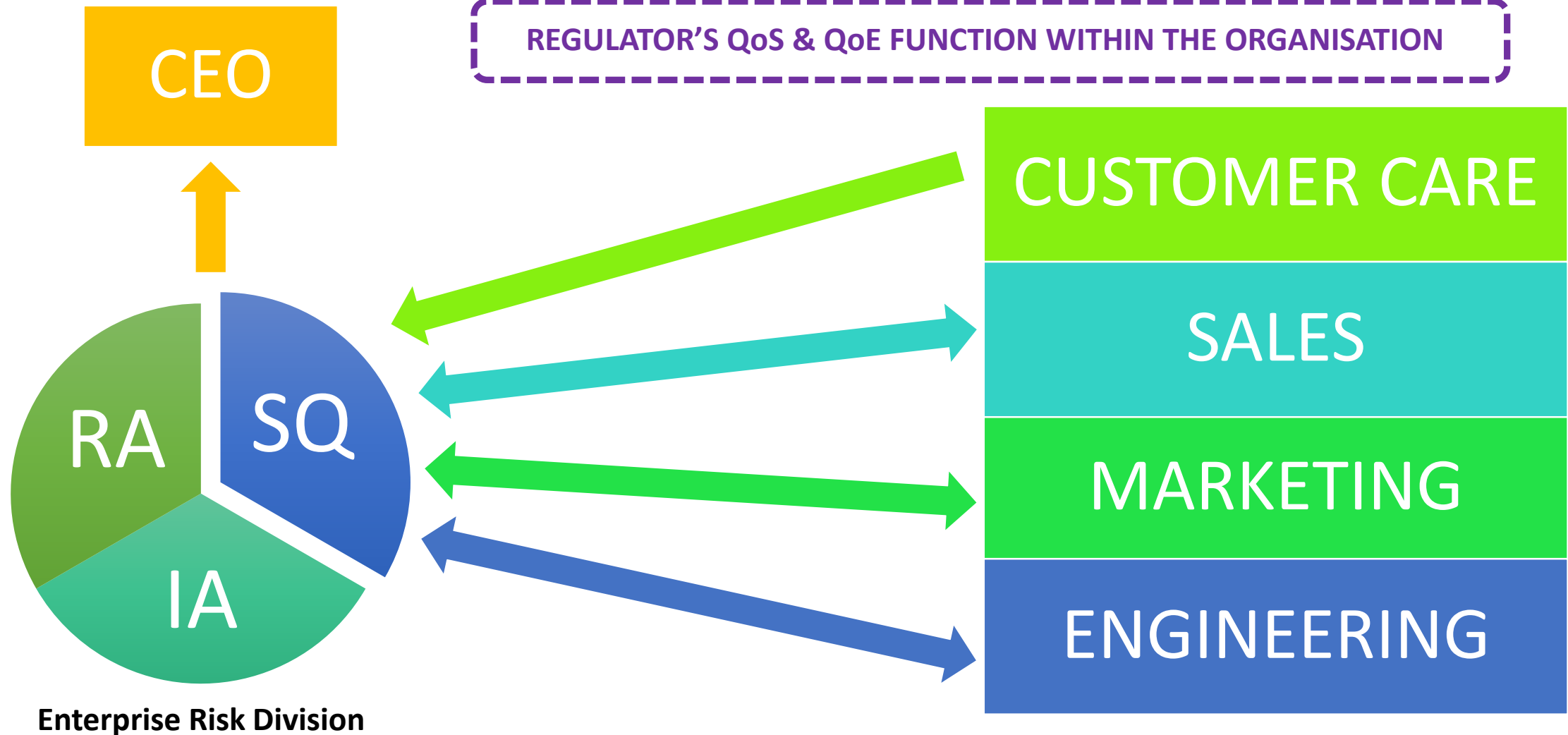


WHO WE ARE?

- Commencing operations in 1993, Mobitel was one of the foremost mobile service providers in Sri Lanka.
- National mobile service provider and the second largest mobile service provider in Sri Lanka.
- The network offers a variety of services and currently operates [GSM](#), [GPRS](#), [EDGE](#), [UMTS](#), [HSPA](#), [HSPA+](#), [DC-HSPA+](#) and [FD-LTE](#) network utilising [2G](#), [3.5G](#) and [4G](#) technologies.
- Currently expanding it's network to facilitate island wide LTE coverage and VoLTE, VoWiFi & NB-IoT services .
- OOKLA has awarded Mobitel as the fastest internet service provider in Sri Lanka several times.



SQ FUNCTION AT MOBITEL



KEY AREAS OF SQ

- Network Performance Monitoring
- Network Audits
- Benchmarking
- Network Data analytics

NETWORK PERFORMANCE MONITORING

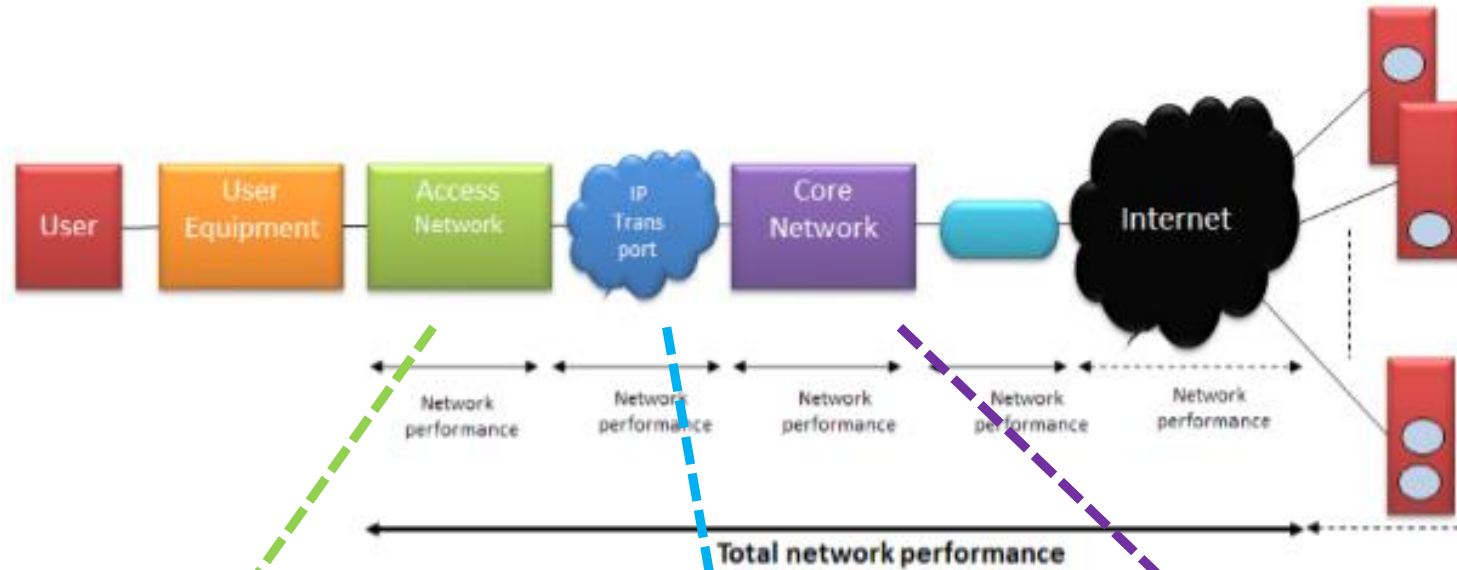


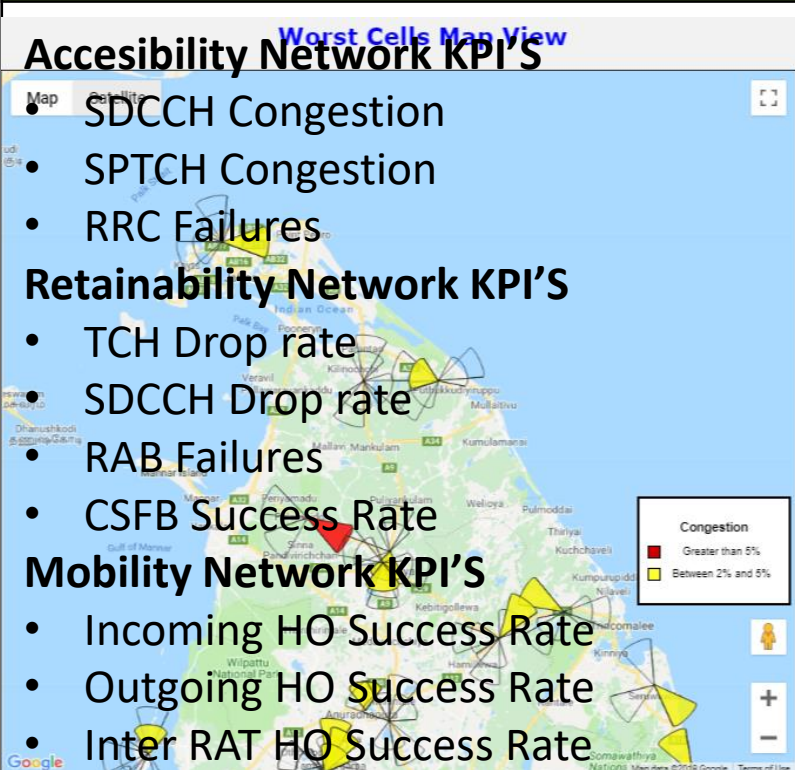
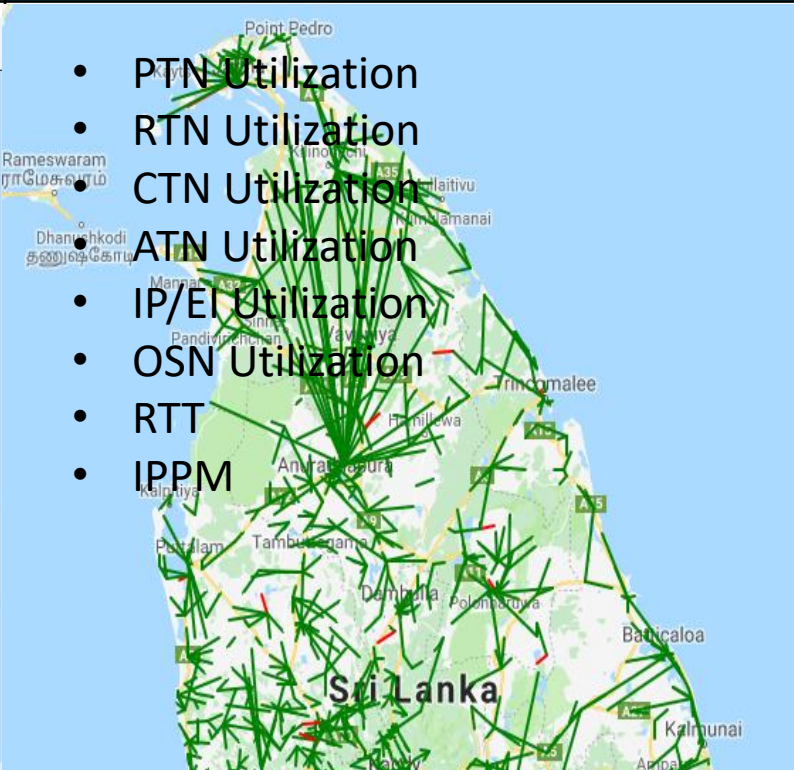
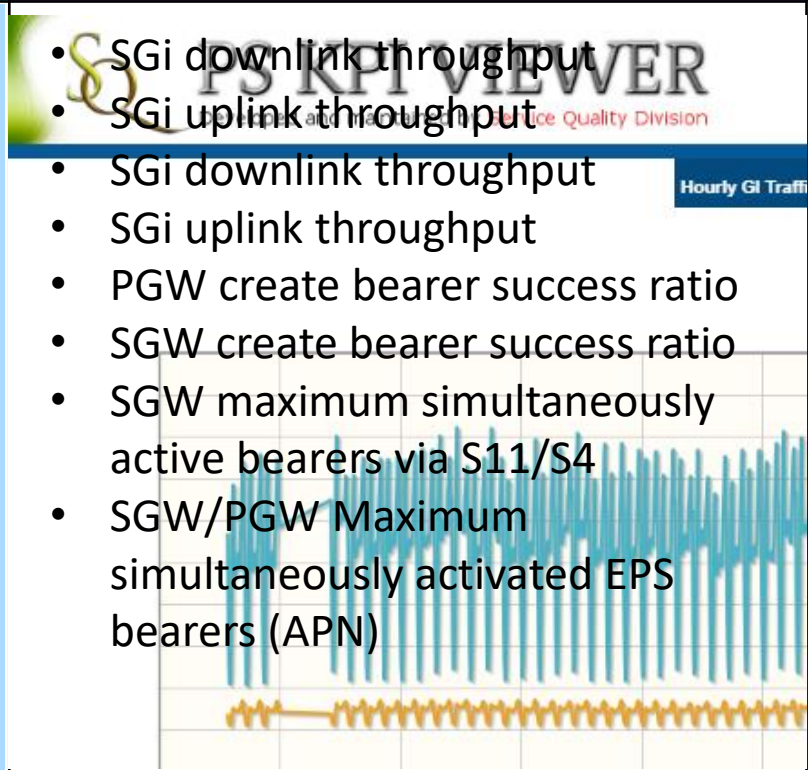
Diagram 1: Network Architecture : Source: ITU

Access Network
KPI Viewer

Transmission
Network KPI
Viewer

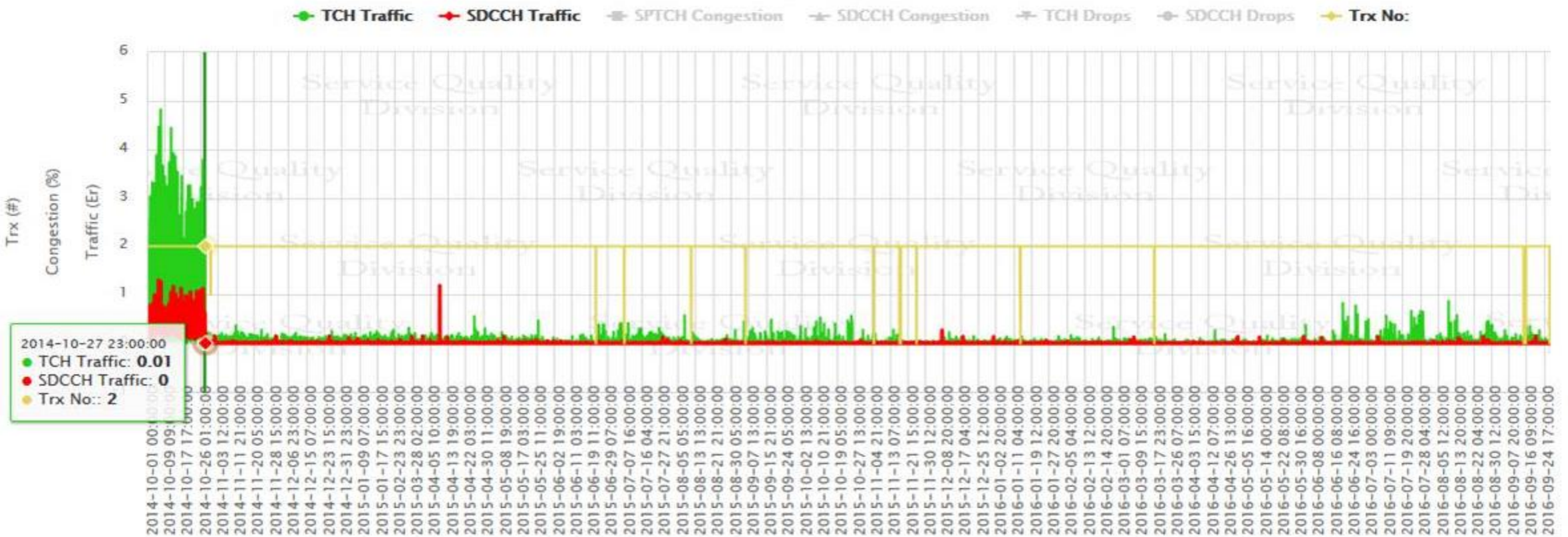
PS/CS Core
Network KPI
Viewer

NETWORK PERFORMANCE MONITORING CONT..

Access Network KPI Viewer	Transmission Network KPI Viewer	PS/CS Core Network KPI Viewer
<p>Worst Cells Map View</p> <p>Accessability Network KPI'S</p> <ul style="list-style-type: none"> • SDCCH Congestion • SPTCH Congestion • RRC Failures <p>Retainability Network KPI'S</p> <ul style="list-style-type: none"> • TCH Drop rate • SDCCH Drop rate • RAB Failures • CSFB Success Rate <p>Mobility Network KPI'S</p> <ul style="list-style-type: none"> • Incoming HO Success Rate • Outgoing HO Success Rate • Inter RAT HO Success Rate 	 <ul style="list-style-type: none"> • PTN Utilization • RTN Utilization • CTN Utilization • ATN Utilization • IP/EI Utilization • OSN Utilization • RTT • IPPM 	<p>PS KPI VIEWER</p> <ul style="list-style-type: none"> • SGi downlink throughput • SGi uplink throughput <p>Hourly GI Traffic</p>  <ul style="list-style-type: none"> • SGi downlink throughput • SGi uplink throughput • PGW create bearer success ratio • SGW create bearer success ratio • SGW maximum simultaneously active bearers via S11/S4 • SGW/PGW Maximum simultaneously activated EPS bearers (APN)

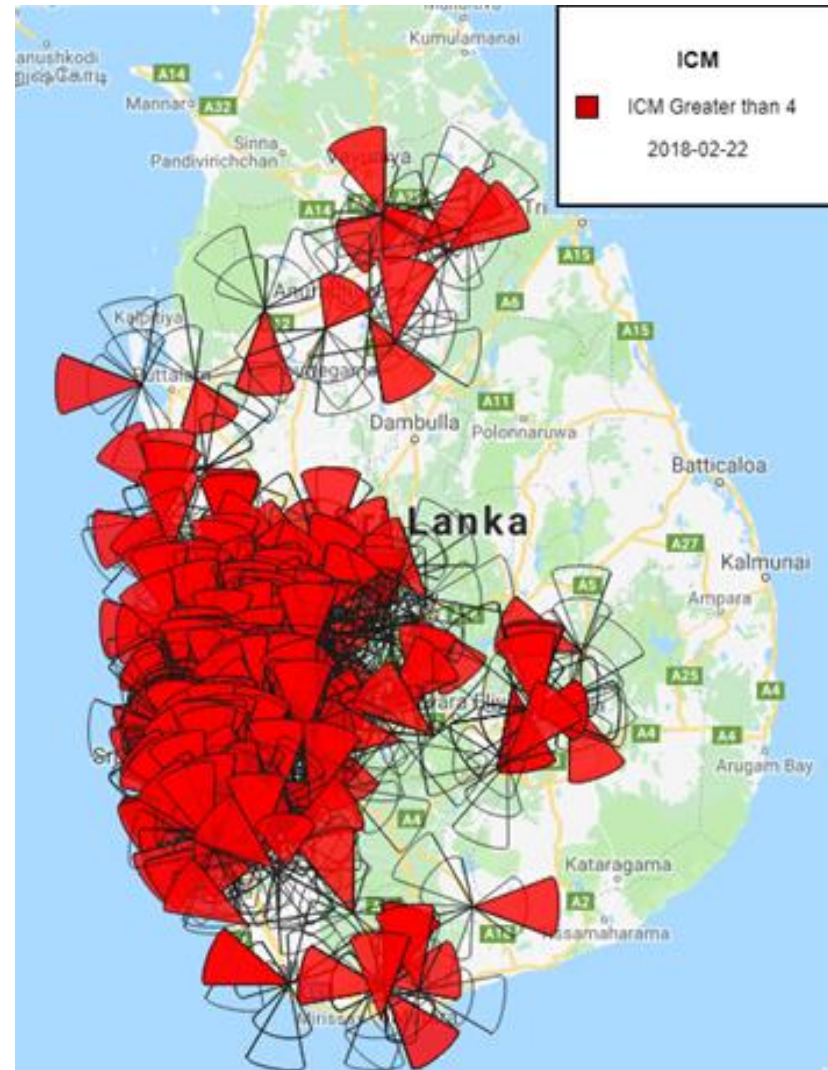
EX: VENDOR ISSUE IDENTIFICATION USING SQ TOOLS

- Sudden zero or low 2G traffic without any alarm being triggered in the system.
- Power Amplifier (PA) fault without any alarms.
- Had to analyze cell wise traffic pattern for long period (3-4 years)



NETWORK AUDITS

- Interference caused by the CDMA 800 MHz system from south Indian operator to the GSM 900 MHz system of Mobitel.
- KPI Viewer audit has been conducted for ICM > 4.
- 900 Mhz band has been released from identified locations and 1800 MHz sites were implemented.



NETWORK AUDITS – CONT...

Codeless phone interference



Telecommunications Regulatory Commission of Sri Lanka



WARNING

The use of DECT 6.0 Cordless phone is ILLEGAL in Sri Lanka

The DECT 6.0 Cordless Phone operates between frequency bands 1880 and 1930 MHz (1.88 and 1.93 GHz)

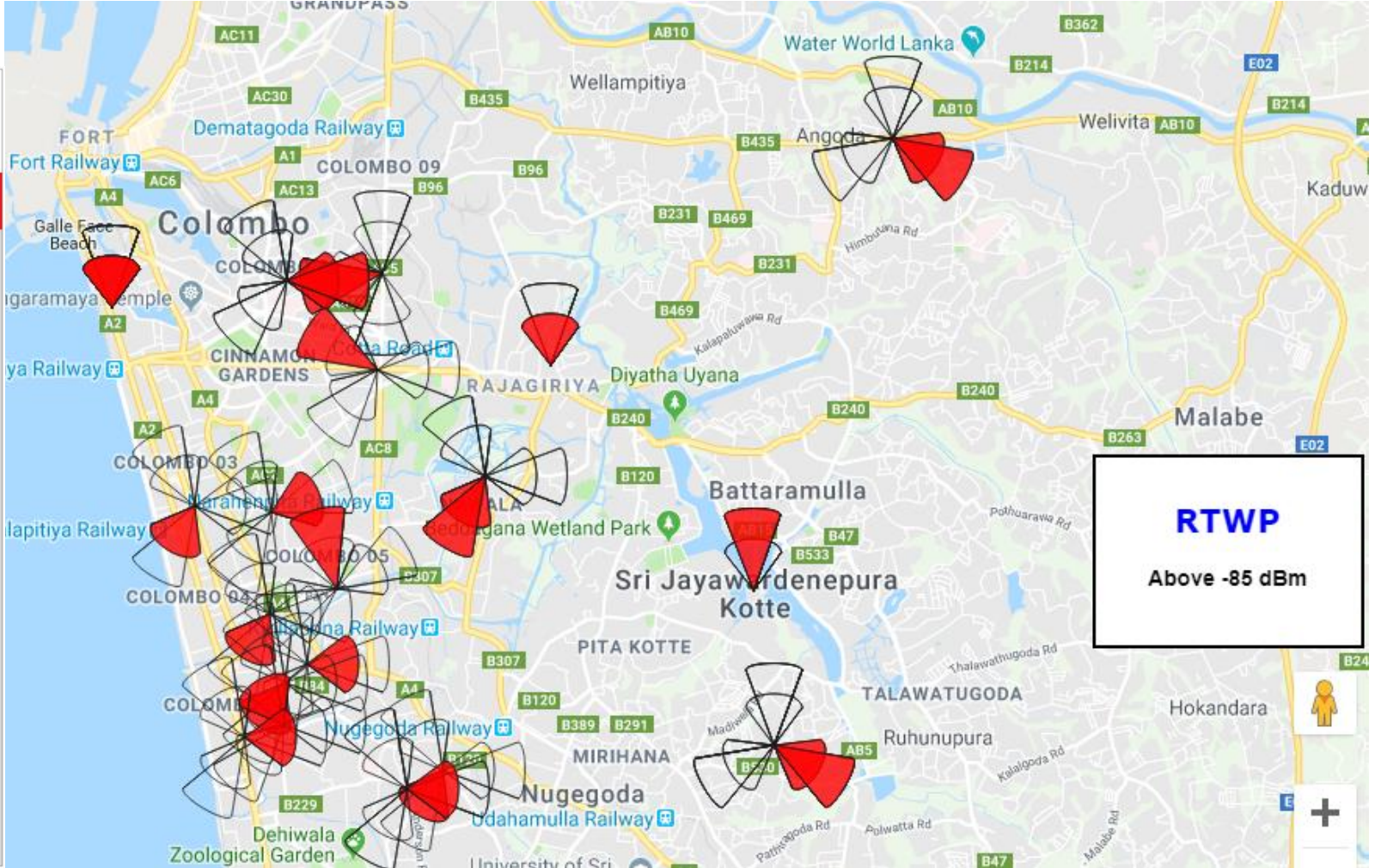
All concerned parties are kindly requested to immediately stop the Importation, Distribution, Sale and Use of DECT 6.0 cordless phones in Sri Lanka as it would be an act punishable by law. Violators will be dealt in accordance with Sri Lanka Telecommunication Act No. 25 of 1991 as Amended



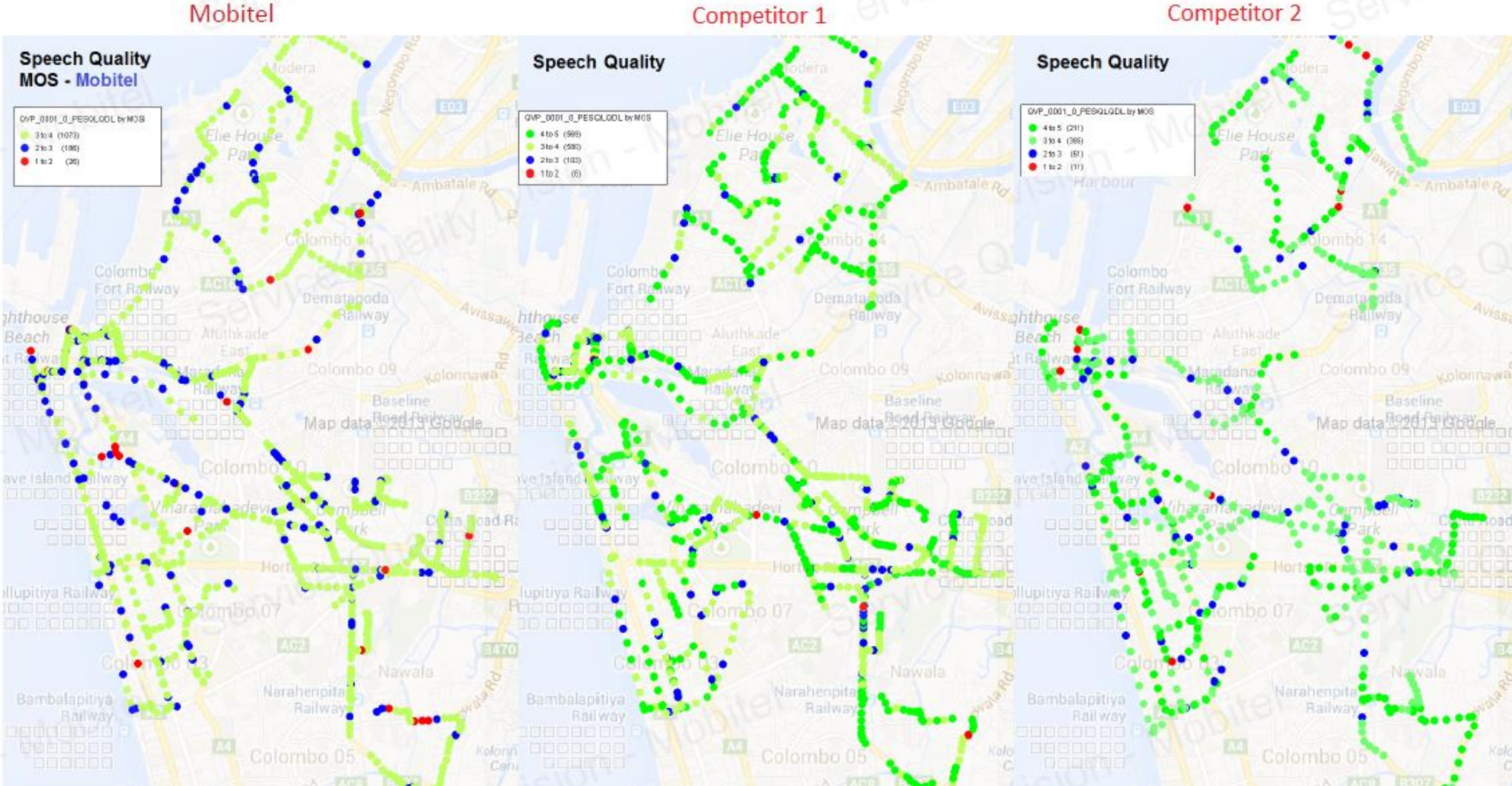
We thank you for your cooperation in creating a safer Sri Lanka.

For more info visit www.trc.gov.lk or call 1900 shortcode.

Director General of Telecommunications
Telecommunications Regulatory Commission of Sri Lanka
276, Elvitigala Mawatha, Colombo 08.

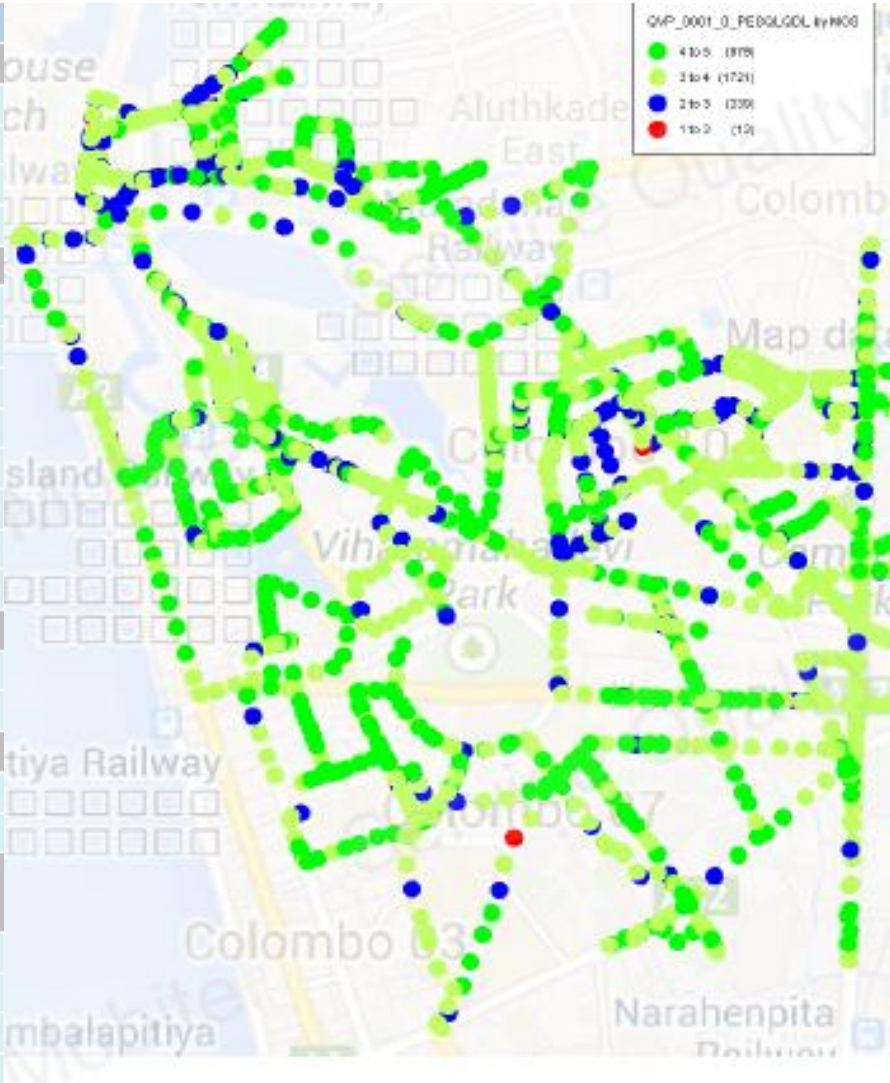


BENCHMARKING – Case Study 1: Voice MOS Degradation

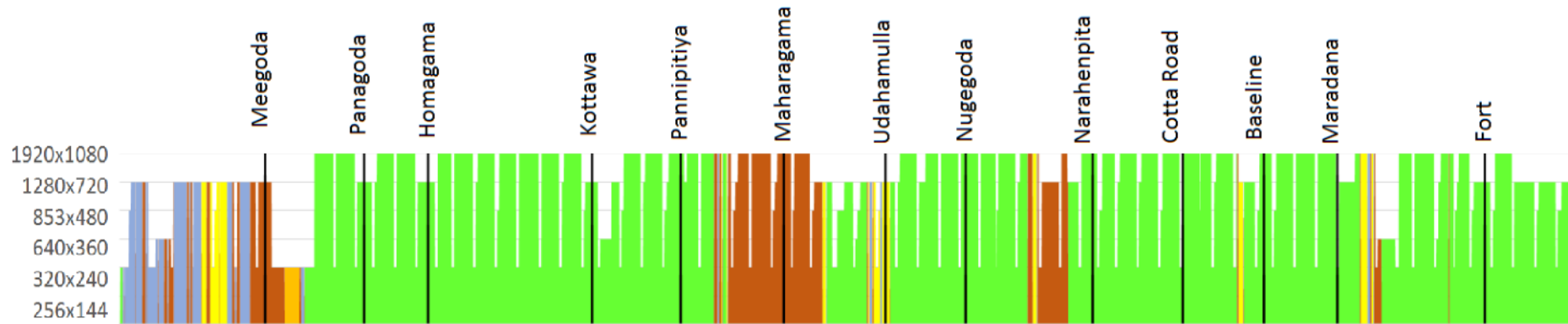
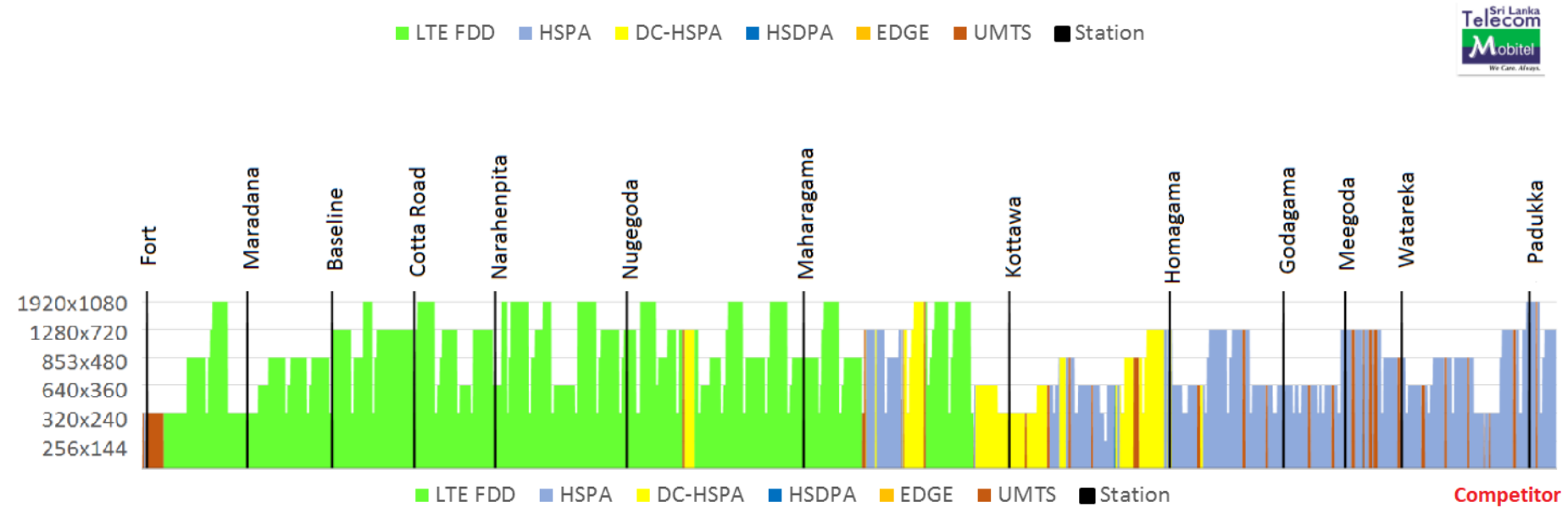


BENCHMARKING – Case Study 1 Cont...

MOS improvement Activities
AMR coding optimization
Change AMR codec count 4 ->7
AMR Starting point adjustment
AMR rate selection threshold adjustment
AMR Automatic UL rate adaptation
Interference Reduction
DTX activation
Enable the ICC and EICC
ICM Performance stat
Adjust Power control parameters
Frequency adjustment
Speech frame repairing
PC Algorithm optimization
Activate Automatic PC value adaptation
Cluster optimization
Neighbor adjustment
Parameter adjustment
Reduce Half rate traffic percentage
Increase TRX in high utilized sites
Adjust HR threshold
Improve Voice quality in the network : core network & transcoders
Inter MSC codec change (G711)
Intra BSC TFO activation
TC Voice enhancement
TC Echo cancellation

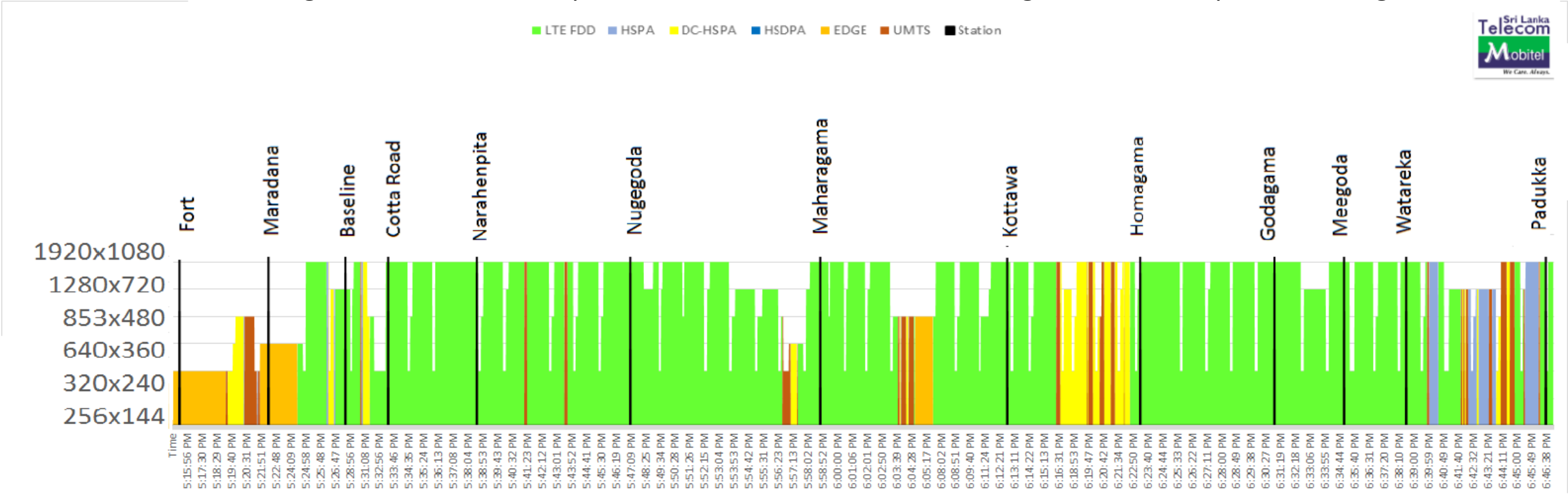


BENCHMARKING – Case Study 2: Video Streaming MOS Degradation



BENCHMARKING – Case Study 2 Cont...

- 2G to LTE Fast Return and 3G to LTE Fast Return Activation.
- Caching server implementation for YouTube.
- Mobitel was configured as a fixed line operator on YouTube side. It has changed to mobile operator configuration.



NETWORK DATA ANALYTICS – INHOUSE DEVELOPMENTS

Mobitel Traffic Distribution Viewer

To derive insights using the automated application of distribution Mobitel Traffic integrated with GND wise population ,technology wise planned coverage of Mobitel.



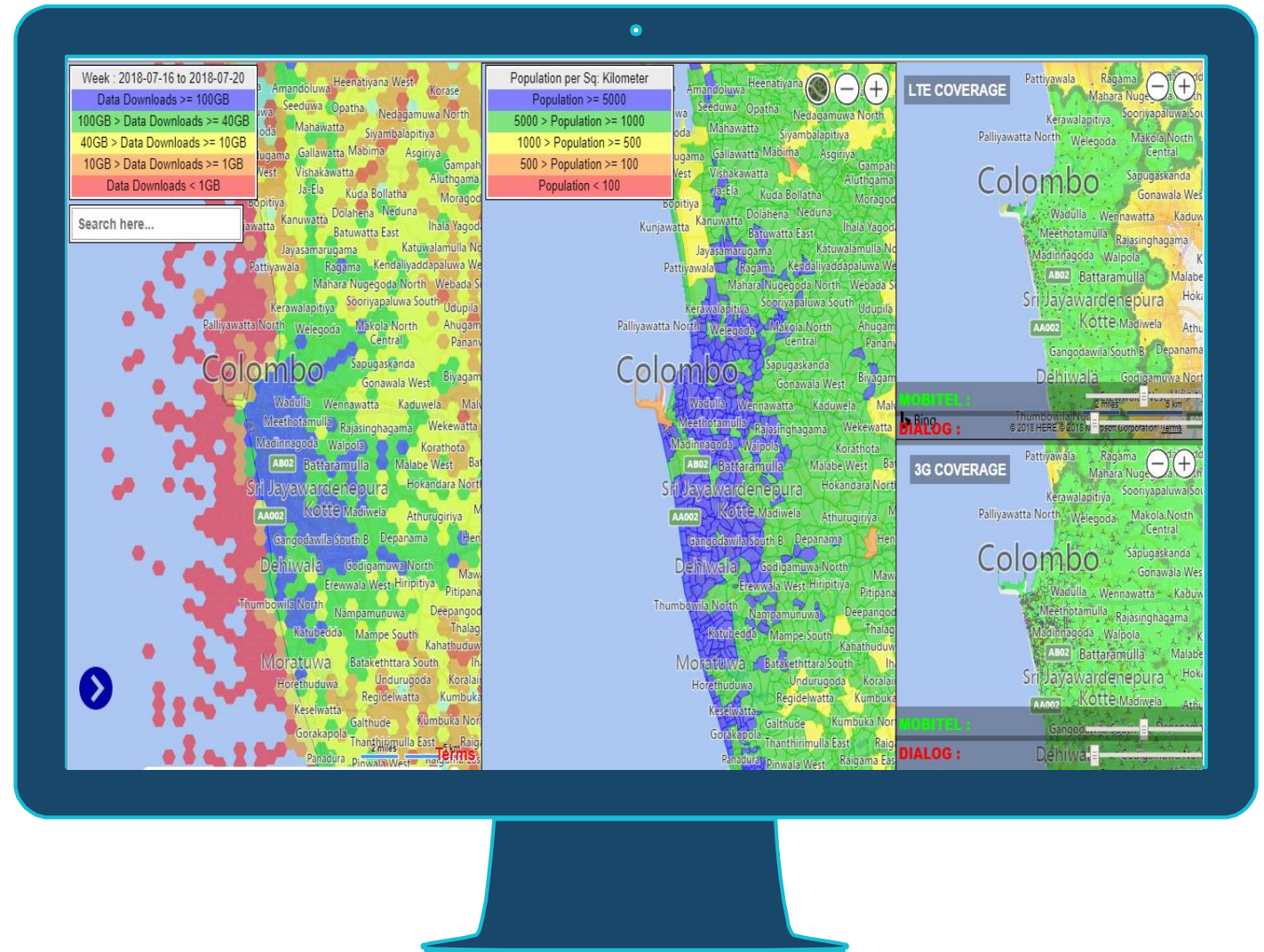
Mobitel Traffic Growth Viewer

To identify occasional, periodic and seasonal traffic trends and traffic patterns to assist Sales, Marketing and Engineering objectives.



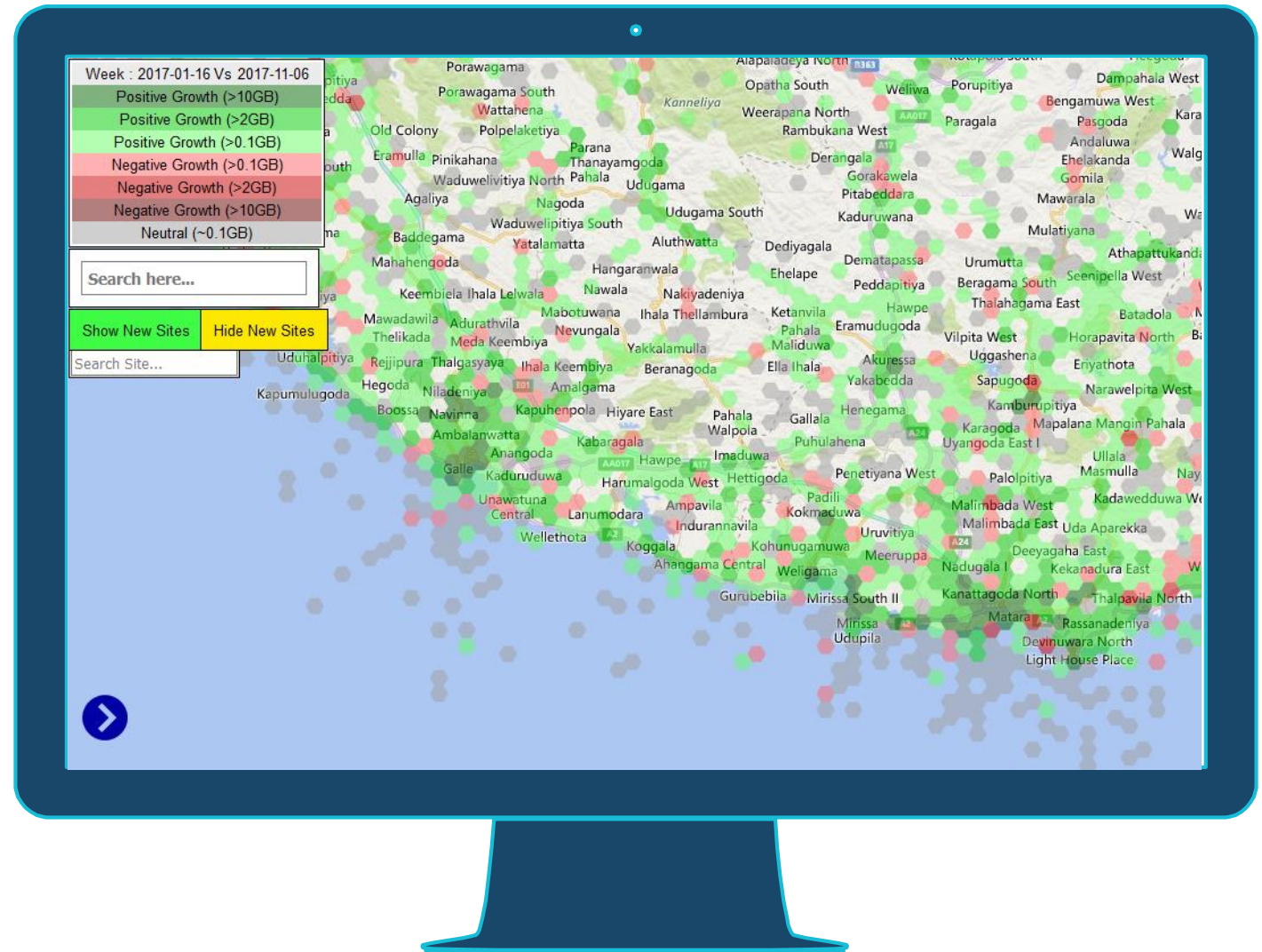
NETWORK DATA ANALYTICS – MTD – FEATURES

- Geographical distribution of Mobitel Voice & Data traffic
- Analysis of traffic with GND wise population density
- Geo map to identify GND best/worst performing GND areas
- Integrated view of traffic vs. planned coverage of Mobitel & the competitor.



NETWORK DATA ANALYTICS - MTG – FEATURES

- Geographical distribution of Mobitel Voice & Data traffic growth
- Analysis of traffic growth with reference to a selected week
- Serving cell patterns and cell wise traffic growth
- Traffic growth due to new site additions



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