

Regulatory Framework in India

Presentation

By

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August 21, 2019

Regulatory Framework

- Network and Customer Service **KPIs**
- **Benchmarks** for each KPI to be met
- Values are reported by Telcos on **quarterly basis for each service area**
- In case, Telecom Operators **fail to meet** the benchmark, **Financial Disincentives per KPI**
- In case of **repeat violations**, amount of **disincentive increased** by 1.5 times (max. 2 times)
- Provision to **audit** the data submitted by Telcos

Regulatory Framework

- Provision to **audit** the data submitted by Telcos
 - Live data is collected from the network
 - Feedback is taken from the selective customers
- Independent **Drive Tests** are conducted
 - 70 cities in a year
 - Highways and Railway tracks
- **Crowdsourced** app is launched to take feedback from the customers

Network KPIs

- **Network Availability:** Base Station Shutdown time
- **Network Accessibility:** Call Setup Success Rate, Signalling & Traffic Channel Congestions
- **Retainability:** **Call Drop**
- **Point of Interconnect (PoI):** Congestion

Customer Service Quality KPIs

- **Metering & Billing Credibility** : Dispute cases less than 0.1%
- **Resolution of Billing Complaints**: Period of applying credit/ waiver (98% within 4 weeks)
- **Response time to the customer for assistance** : **Accessibility of call centres/ customer care** (95% within 90 seconds)
- **Termination/ Closure of Services**: Within 7 days
- **Time taken for refund of deposits**: After closure of services (100% within 6 weeks)

AVERAGE TO PERCENTILE

DROP CALL RATE (DCR)

Methodology changed for DCR Assessment



Spatial
Distribution

Cell wise

Which Pockets of
network did not
perform well



Temporal
Distribution

Day wise

On Which Days
network did not
perform well



Technology
Agnostic

Consolidated

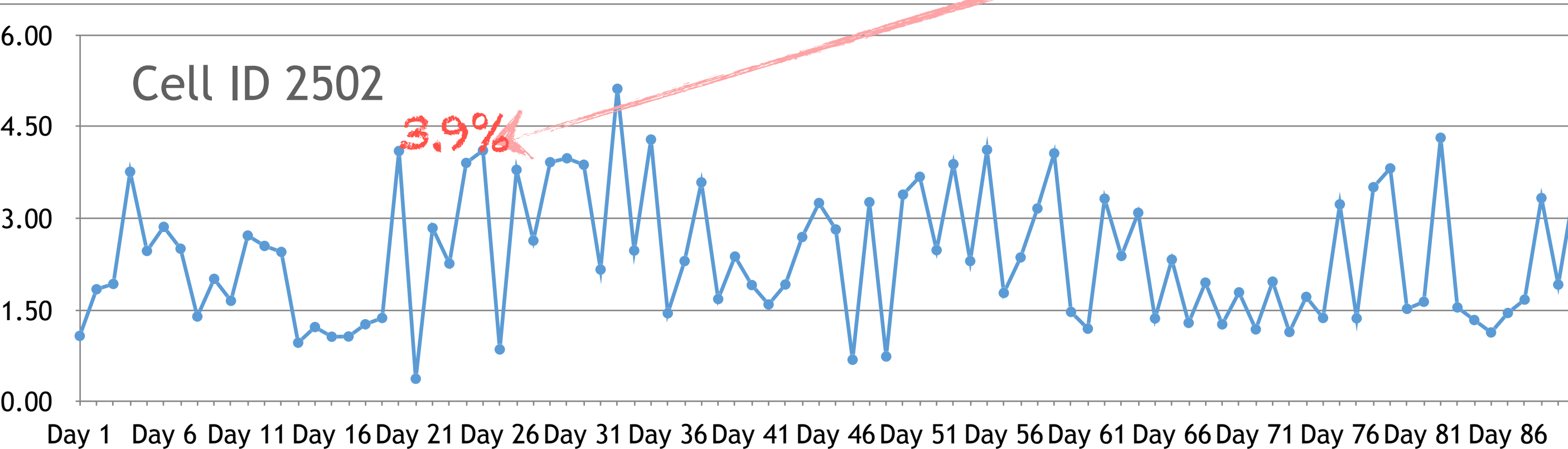
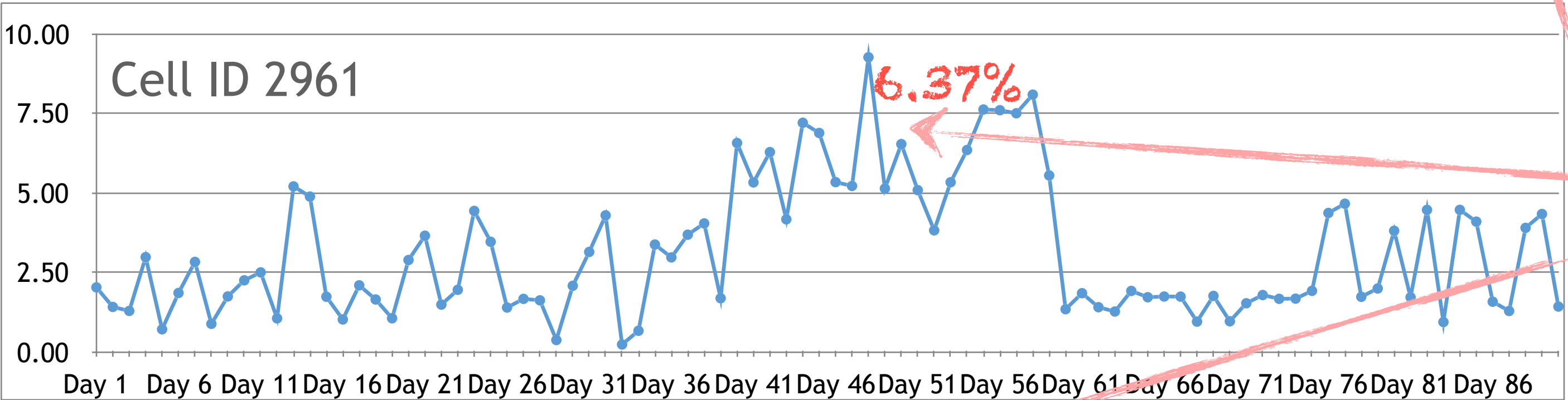
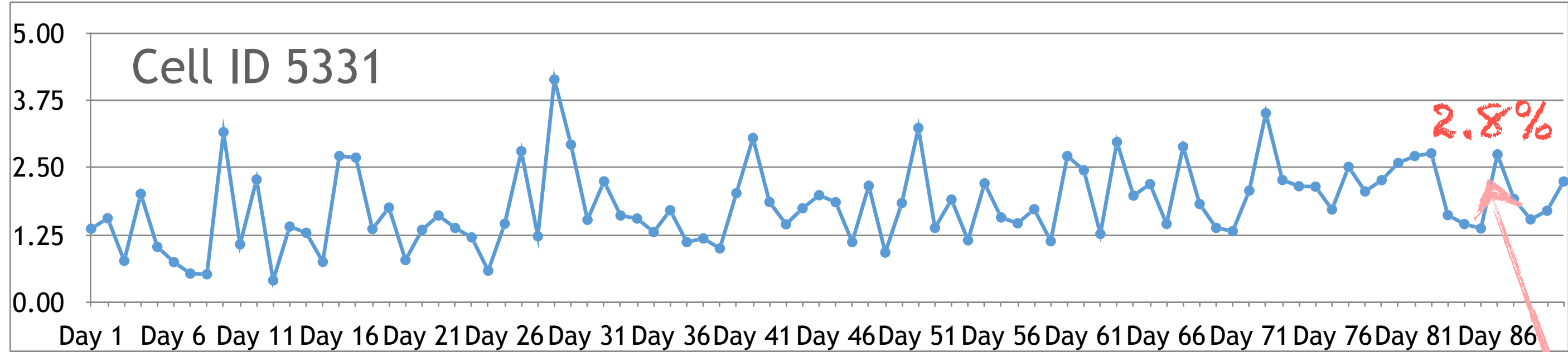
All Access
Technologies
KPIs aggregated

Drop Call Rate (DCR) of a Network (Temporal)

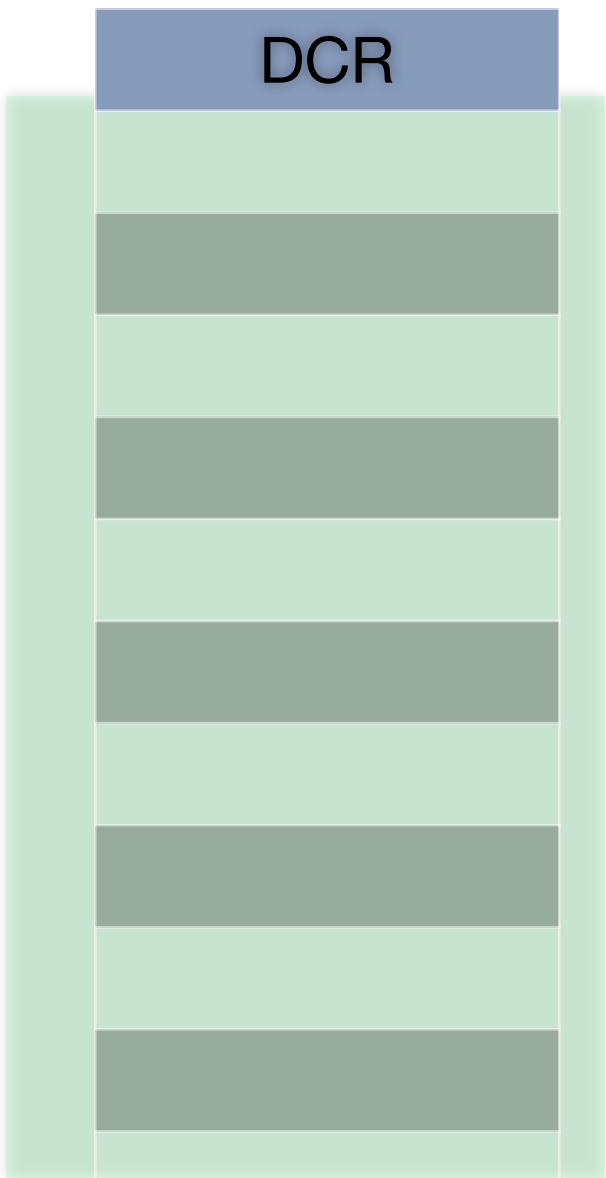
Operator-1

Delhi

Jan-March 2019



Cell_Q



Cell ID 13852

1.81%

$Q_{SD}(90,90)$

Cell ID 5331

2.8%

Cell ID 2502

3.9%

Cell ID 2961

6.37%

Drop Call Rate (DCR)

• Cell_Q(90)= 90th Percentile value

- Benchmarks
 - $Q_{SD}(90,90) \leq 2\%$
 - $Q_{TD}(97,90) \leq 3\%$

Cell	D1	D2				D92	Rep Cell(Q)
CGI	DCR	DCR				DCR	
CGI	DCR	DCR				DCR	
CGI	DCR	DCR				DCR	
CGI	DCR	DCR				DCR	Q _{SD}
CGI	DCR	DCR				DCR	
Rep. Day(Q)					Q _{TD}		

• Day_Q(97)= 97th Percentile value

Representative Value for Day: Day(Q)

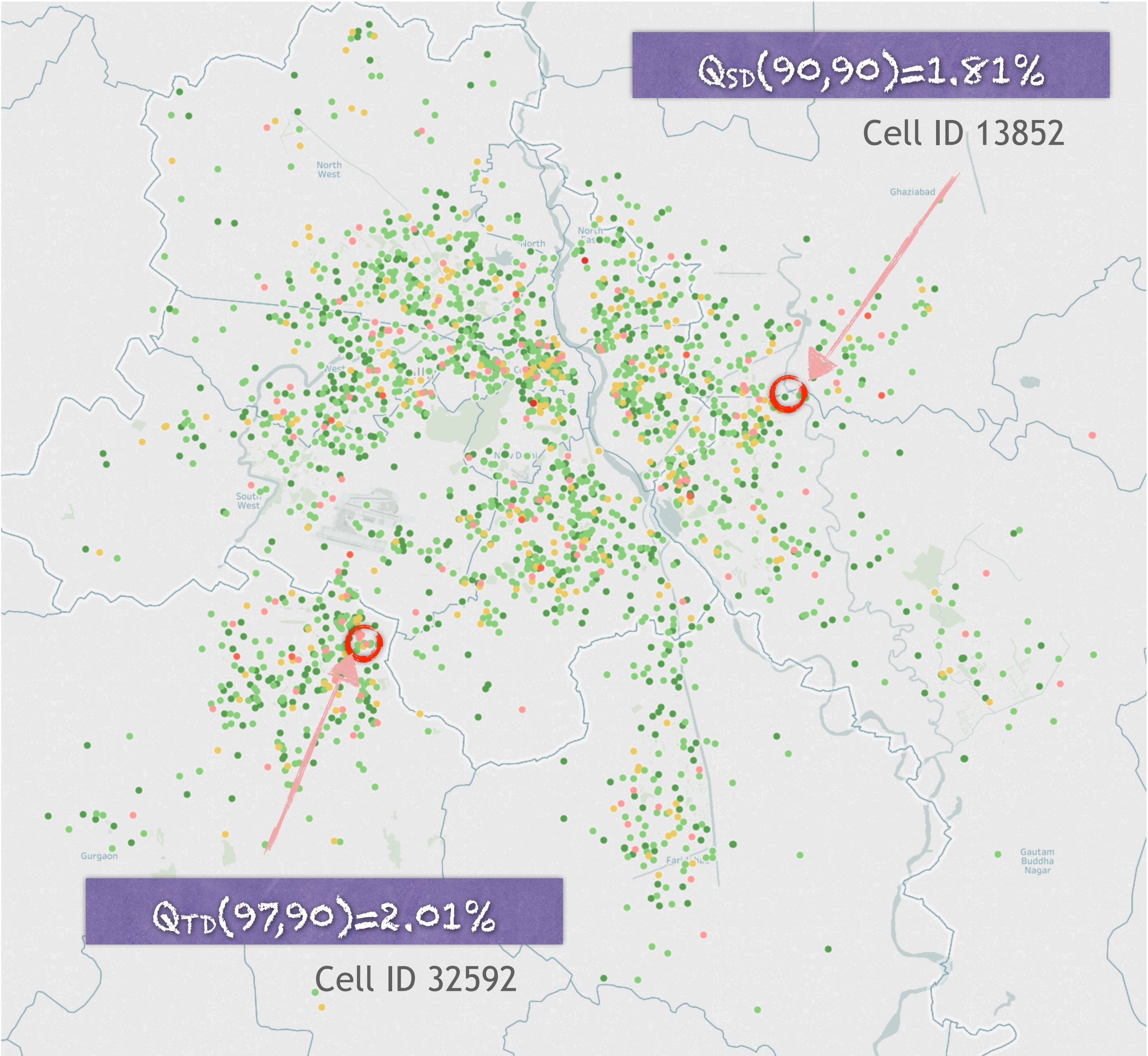
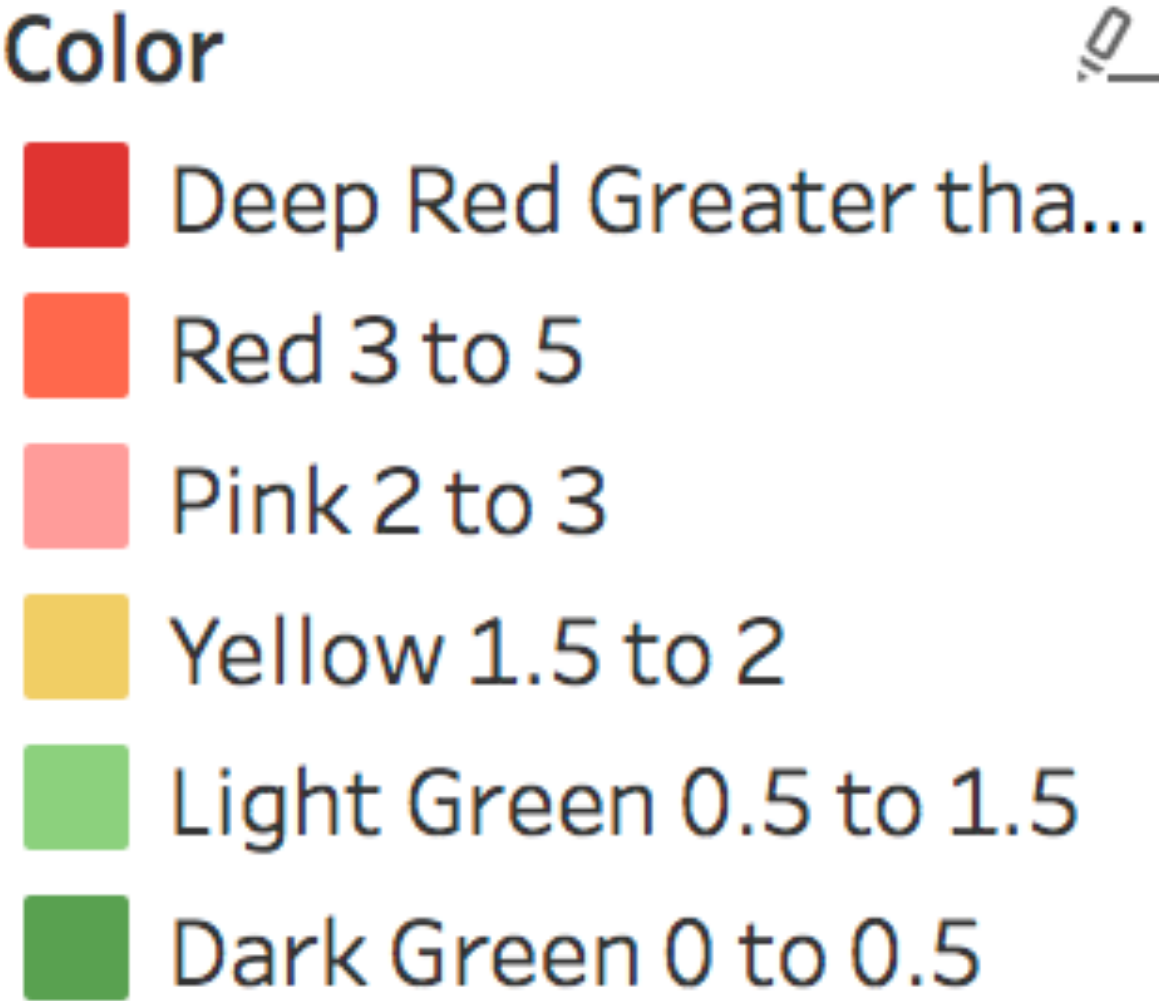
- Day (Q)
 - $\text{Day}_Q(97) = 97^{\text{th}}$ Percentile value
- “Day_Q(97)” means $\text{Dat}_Q(s)$ with $s=97$ and indicates the 97th percentile DCR value in the set of DCR values of all cells of the network for that particular a Day.

Cell	D1	D2				D92	Rep Cell(Q)
C ₁	0.7%	0.0%	NAV	.....	2.8%	1.3%	1.3%
C ₂	2.4%	0.4%	1.6%	.....	0.9%	0.2%	1.6%
.....	
C ₉₀₈₁	NOP	1.7%	1.1%	.....	NDM	0.6%	Q _{SD}
.....	
C ₁₅₆₆₁	0.2%	0.1%	2.9%	.....	6.4%	1.5%	2.9%
Rep. Day(Q)					Q _{TD}		

Spatial Distribution

Operator-1 Delhi

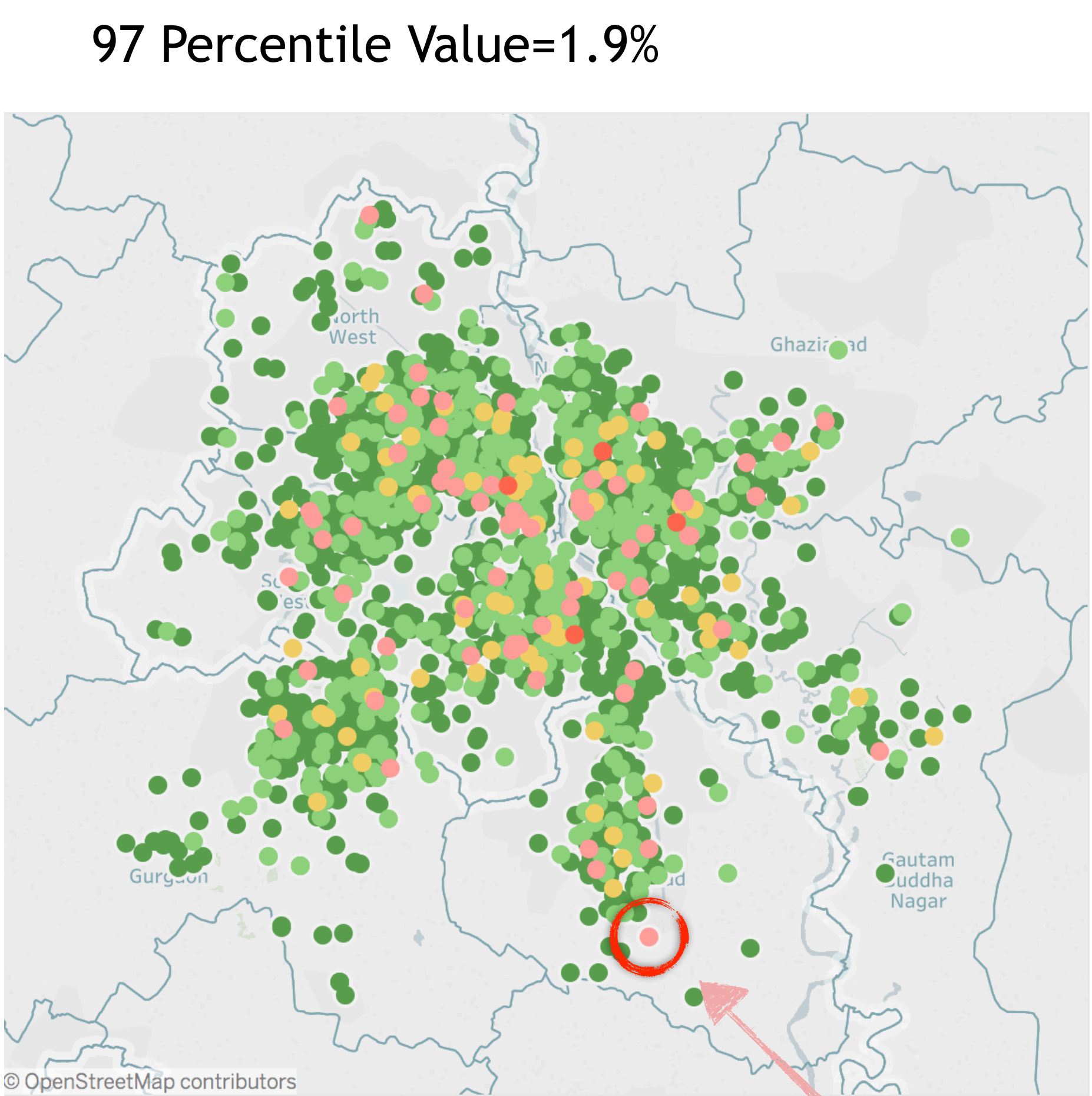
Jan-March 2019



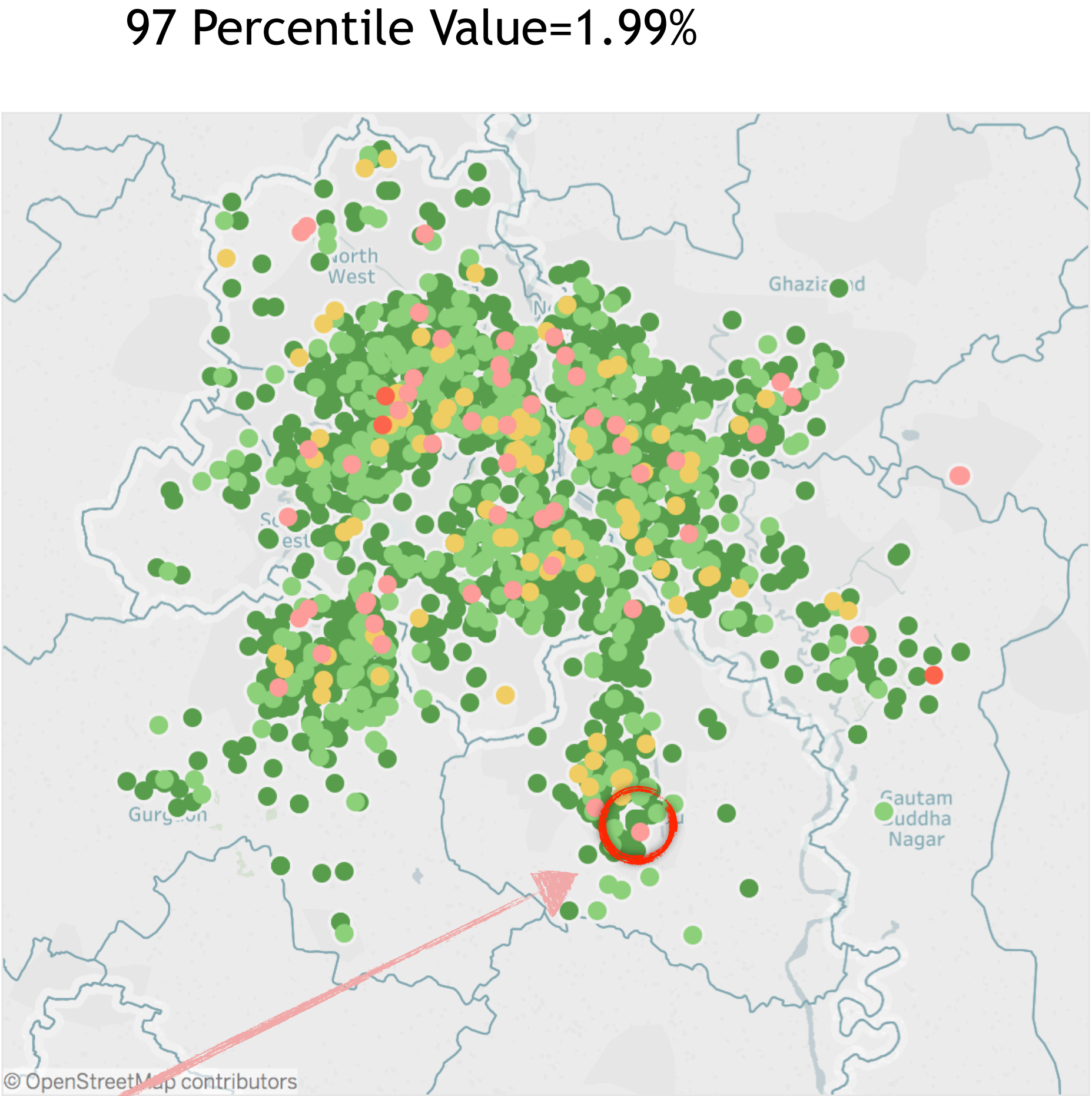
Temporal Distribution

Operator-1 Delhi

Jan-March 2019



Day 01



Day 02

- Color
- Deep Red Greater tha...
 - Red 3 to 5
 - Pink 2 to 3
 - Yellow 1.5 to 2
 - Light Green 0.5 to 1.5
 - Dark Green 0 to 0.5

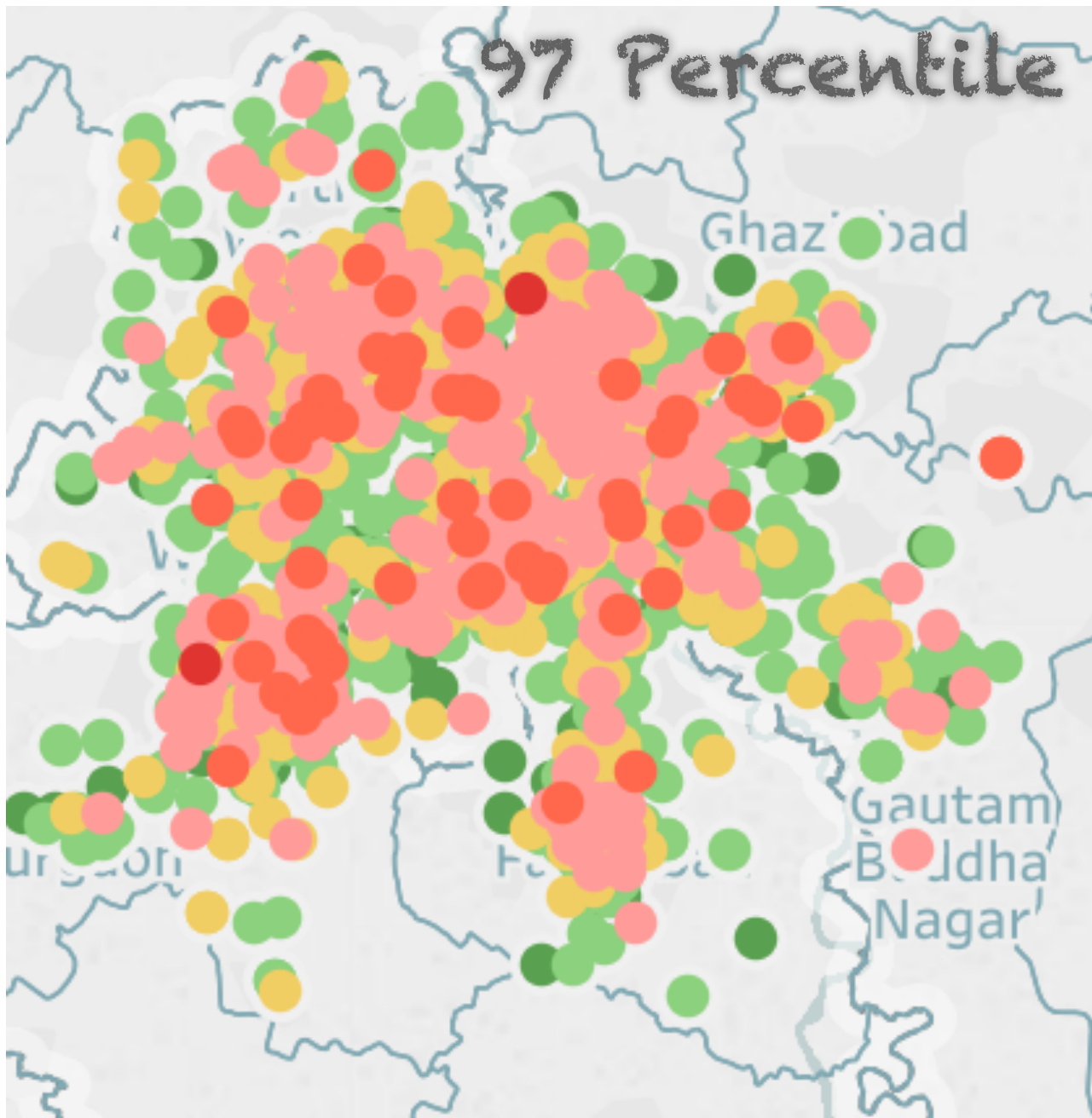
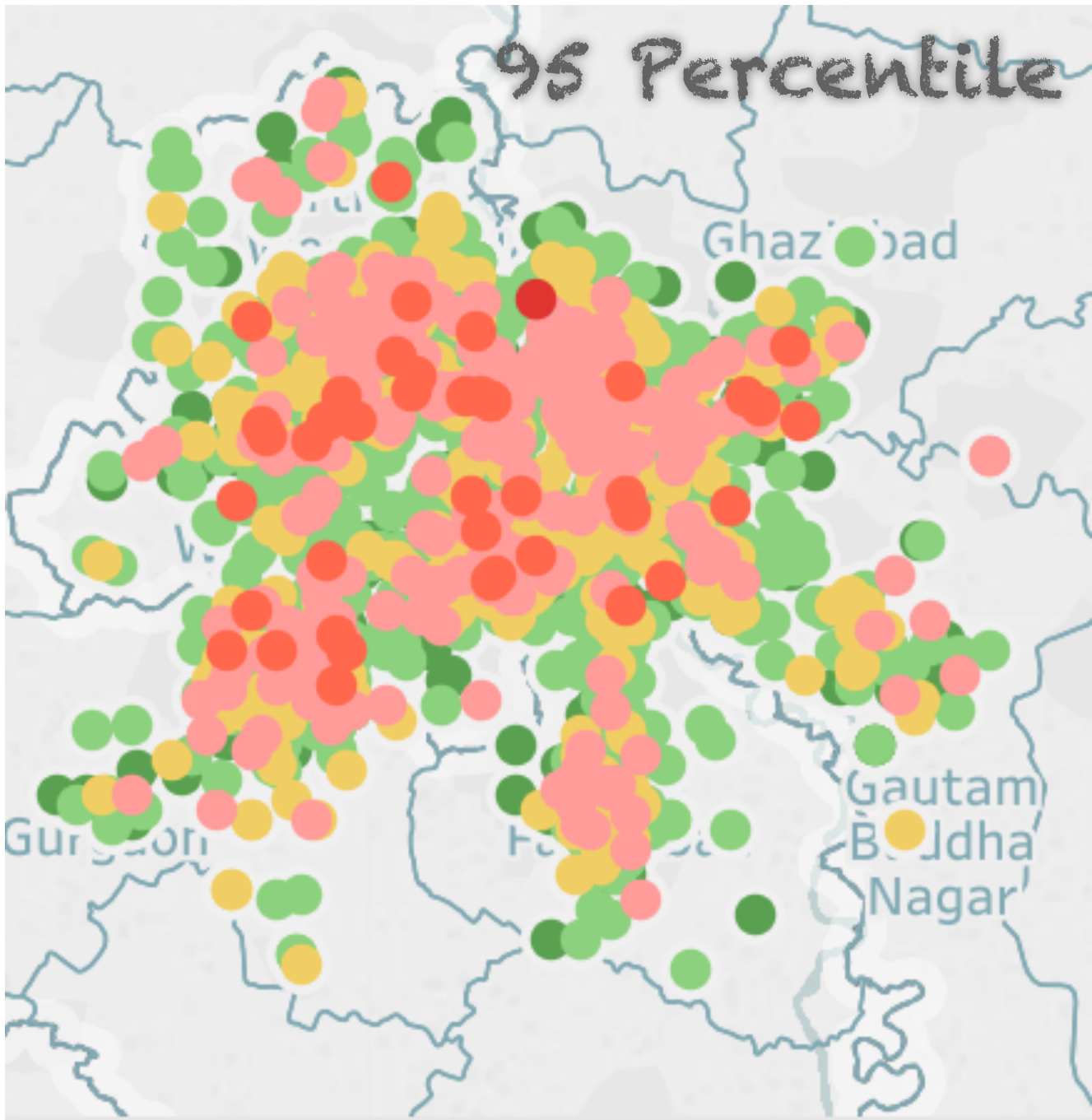
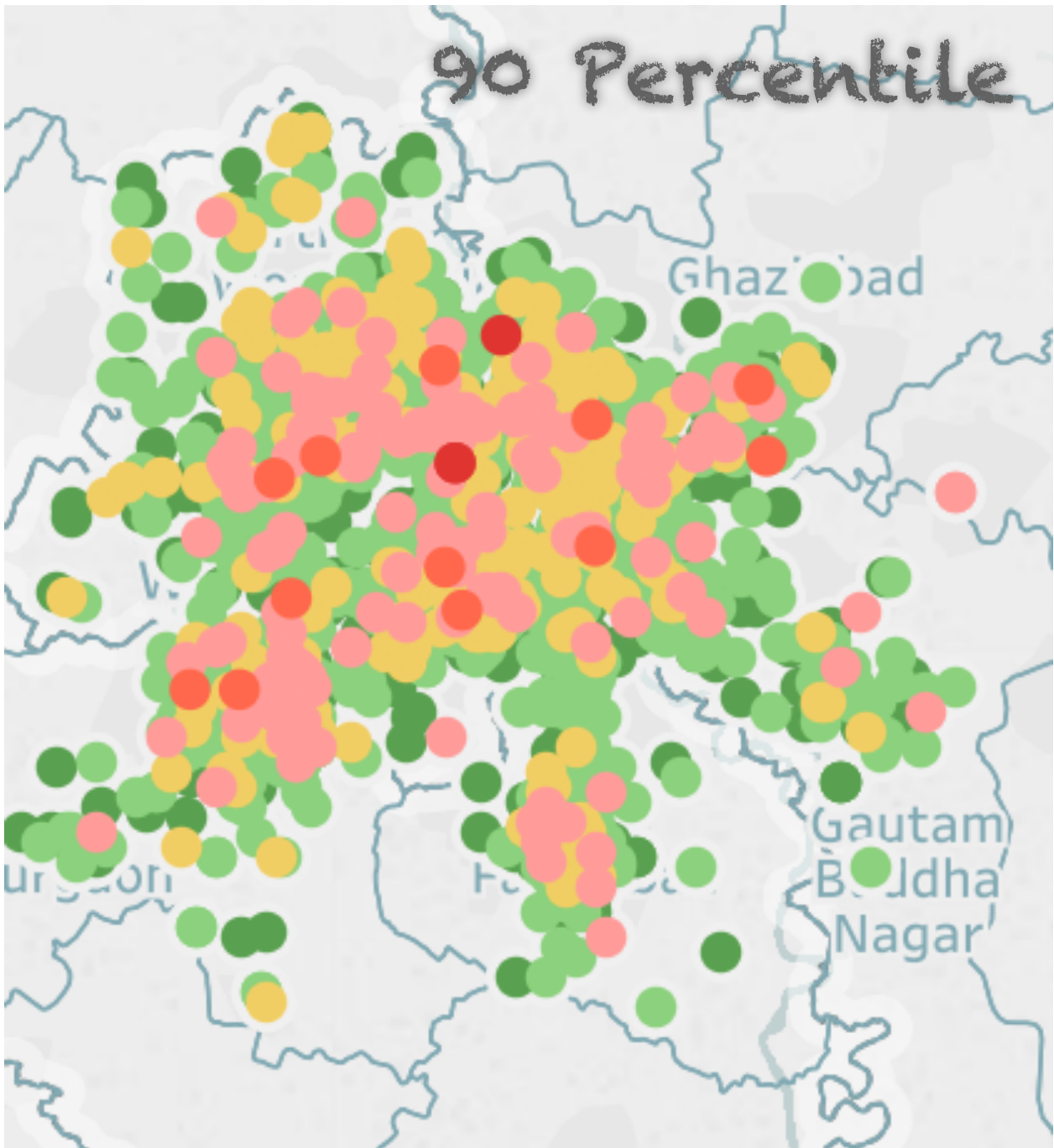
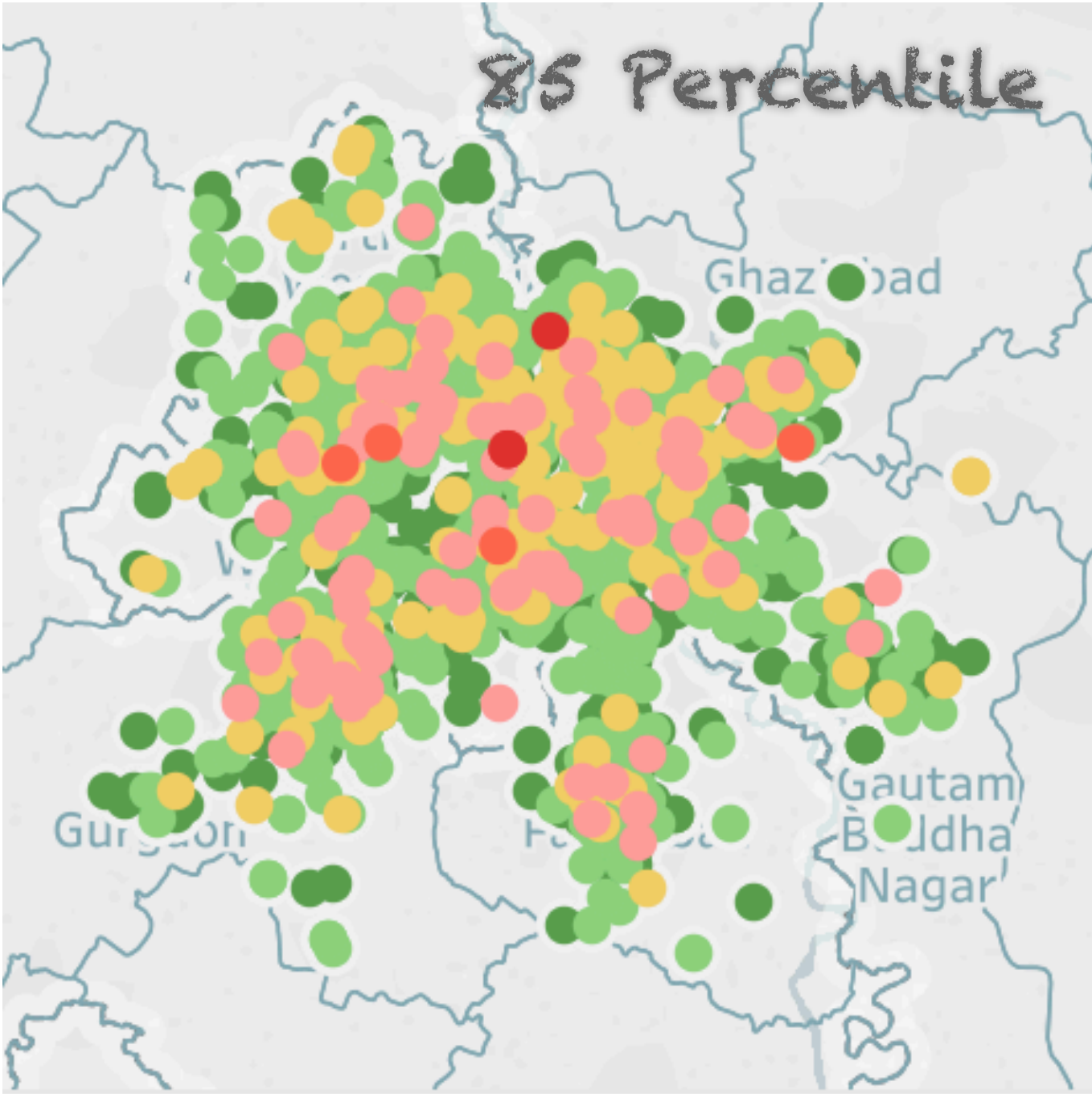
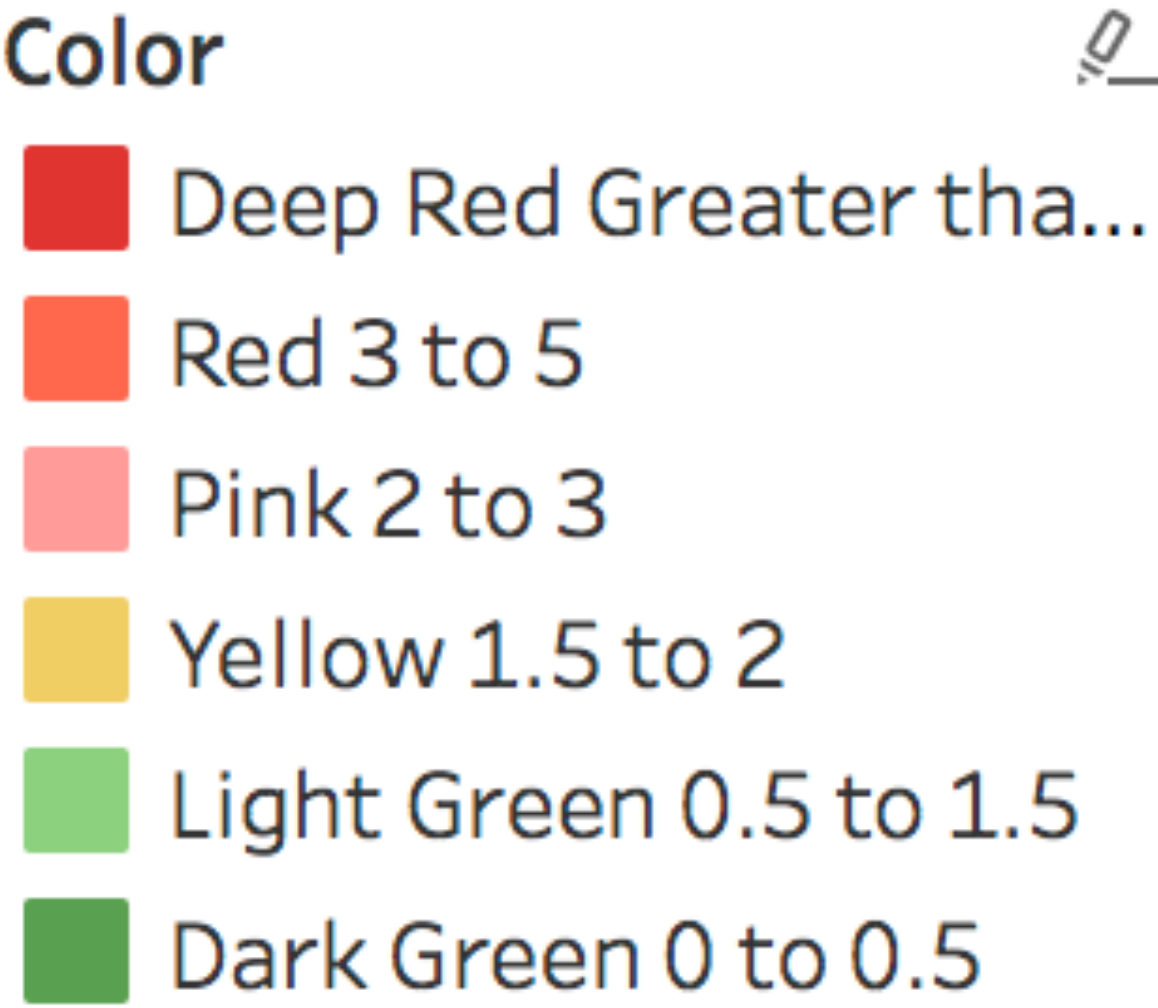
Cell with DCR > 5%

Temporal Distribution

Operator-1

Delhi

Jan-March 2019



VOICE CALL QUALITY

OTHER ASPECTS

VoLTE & CSFB

Purpose	Parameter	Definition	Benchmark
Avoid Post Dialing Delay	Call setup time	<p>Time interval (in seconds) between the end of dialling by the caller and the reception back by him of the appropriate ringing tone or recorded announcement.</p> <p>Equivalent to call set-up time, as defined in [ITU-T E.800]</p>	<7 sec
Avoid Voice muting	PDCCP SDU Loss rate	Fraction of IP packet lost (not successfully received) on the Uplink & downlink	≥98%

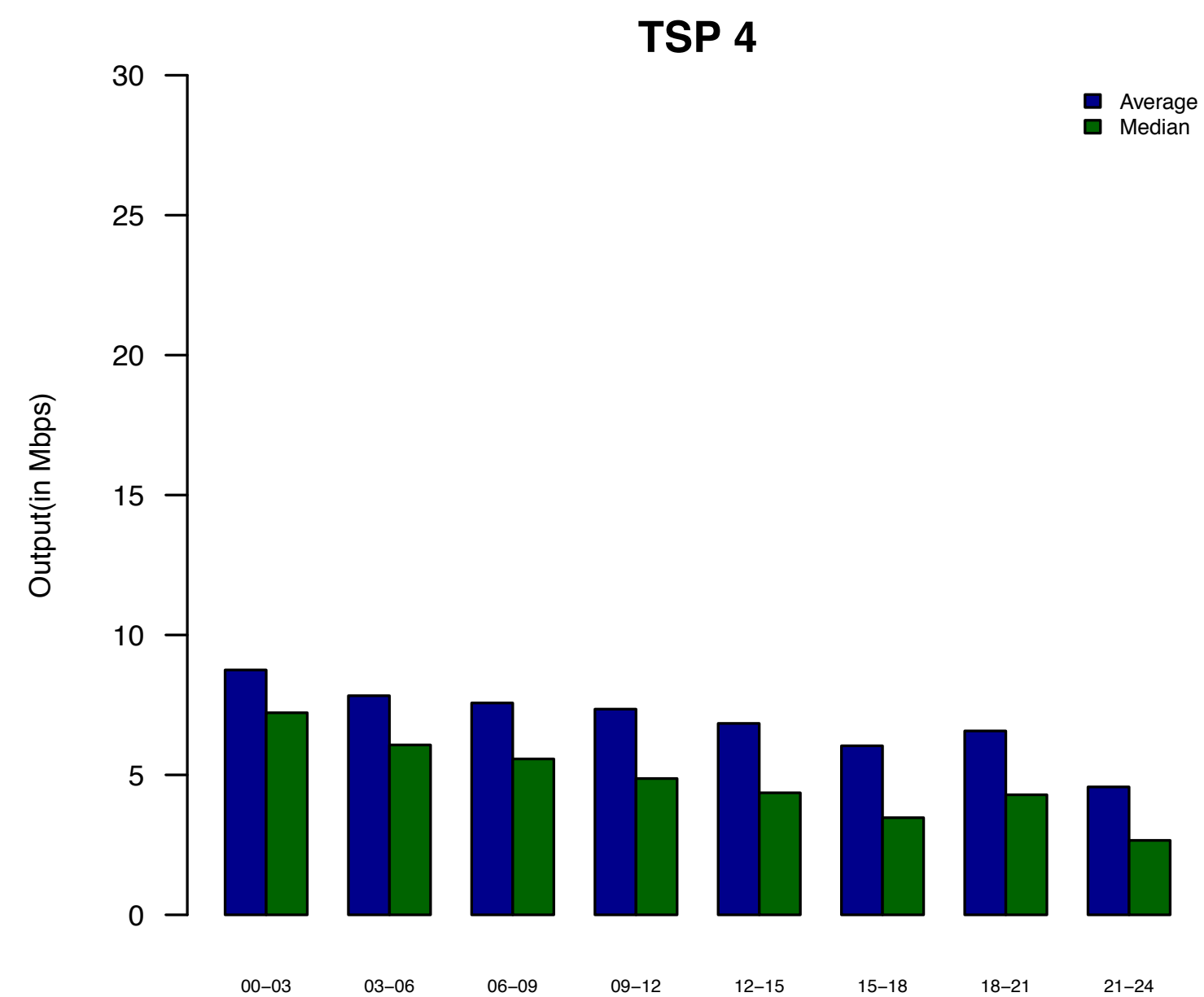
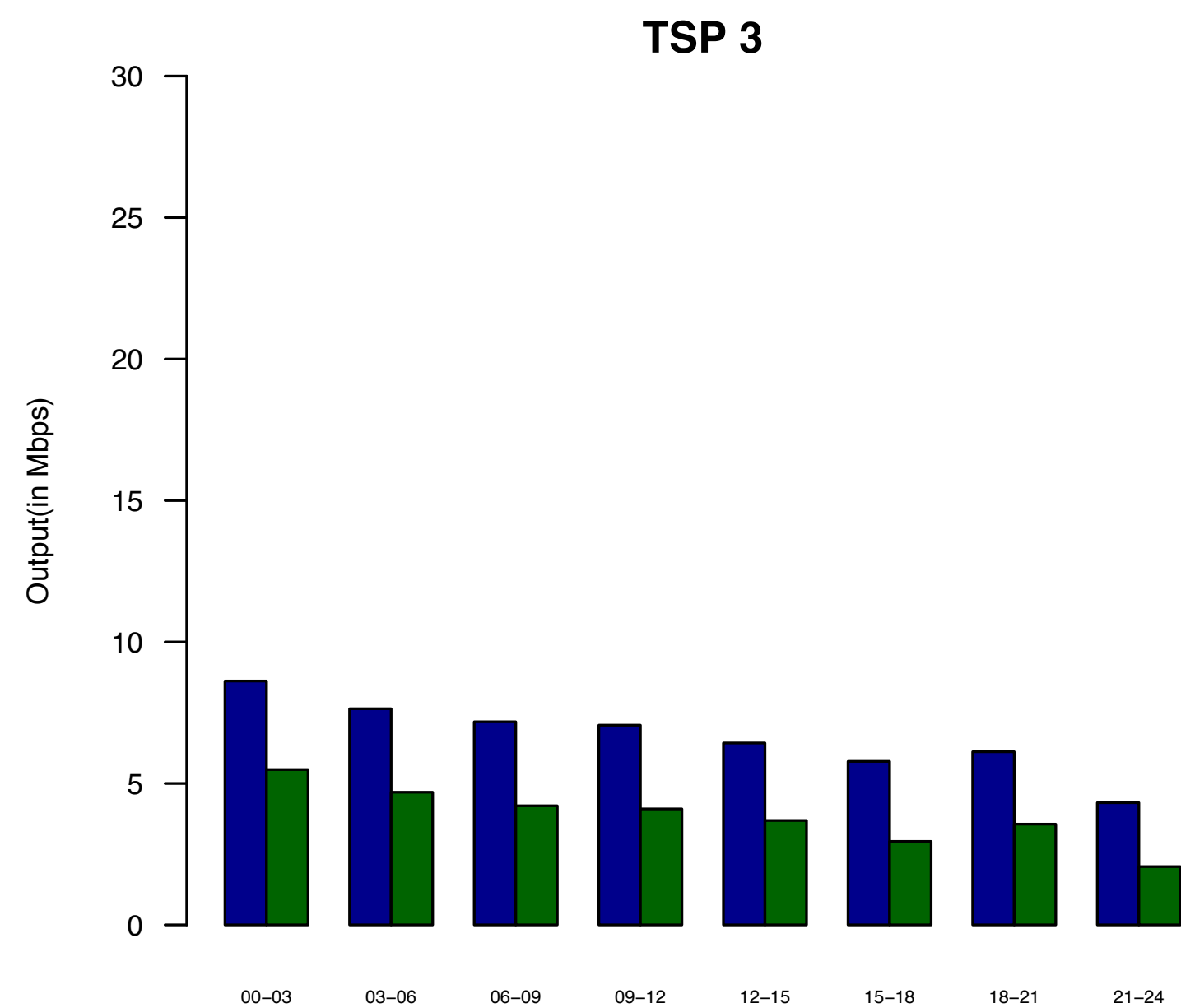
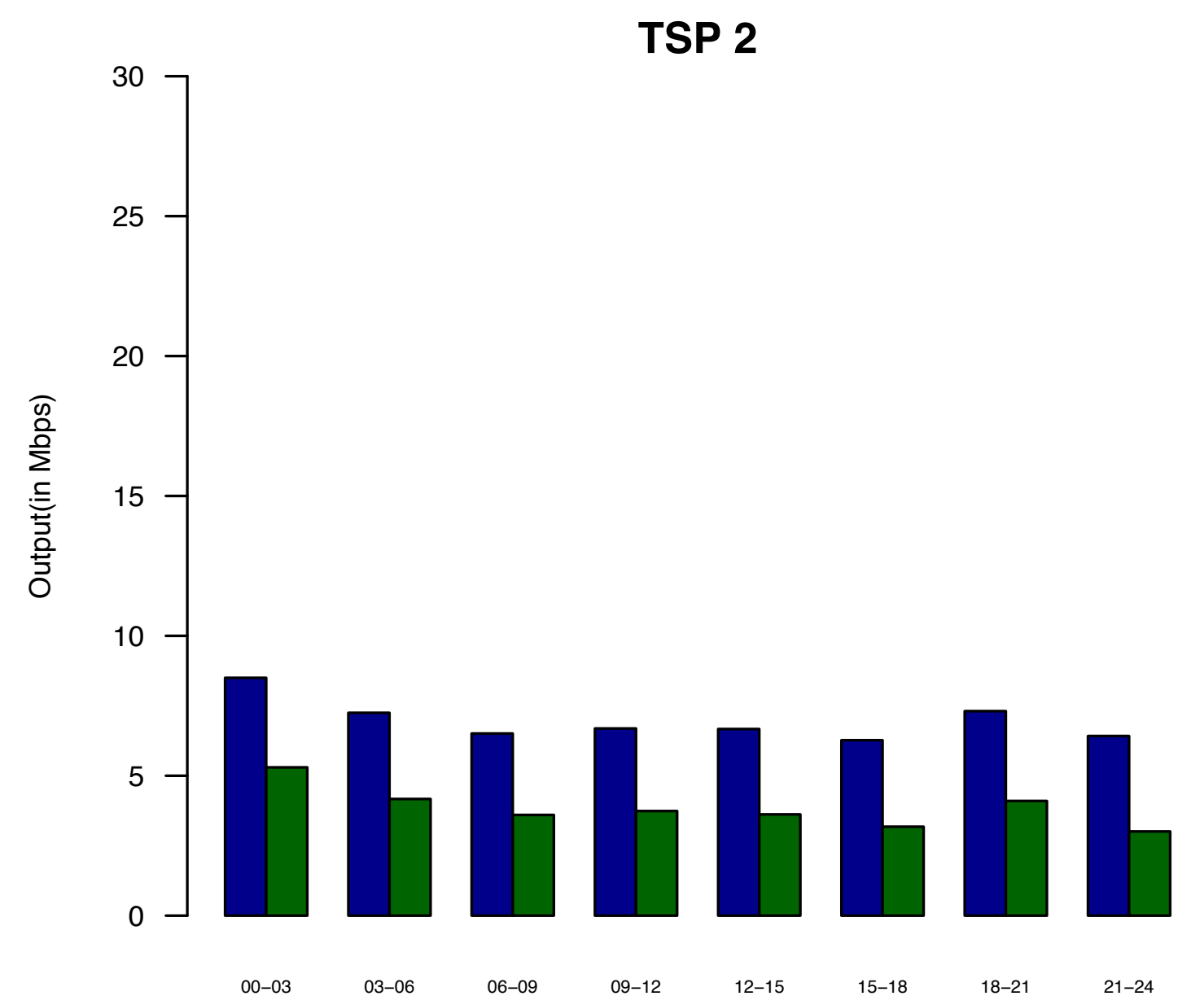
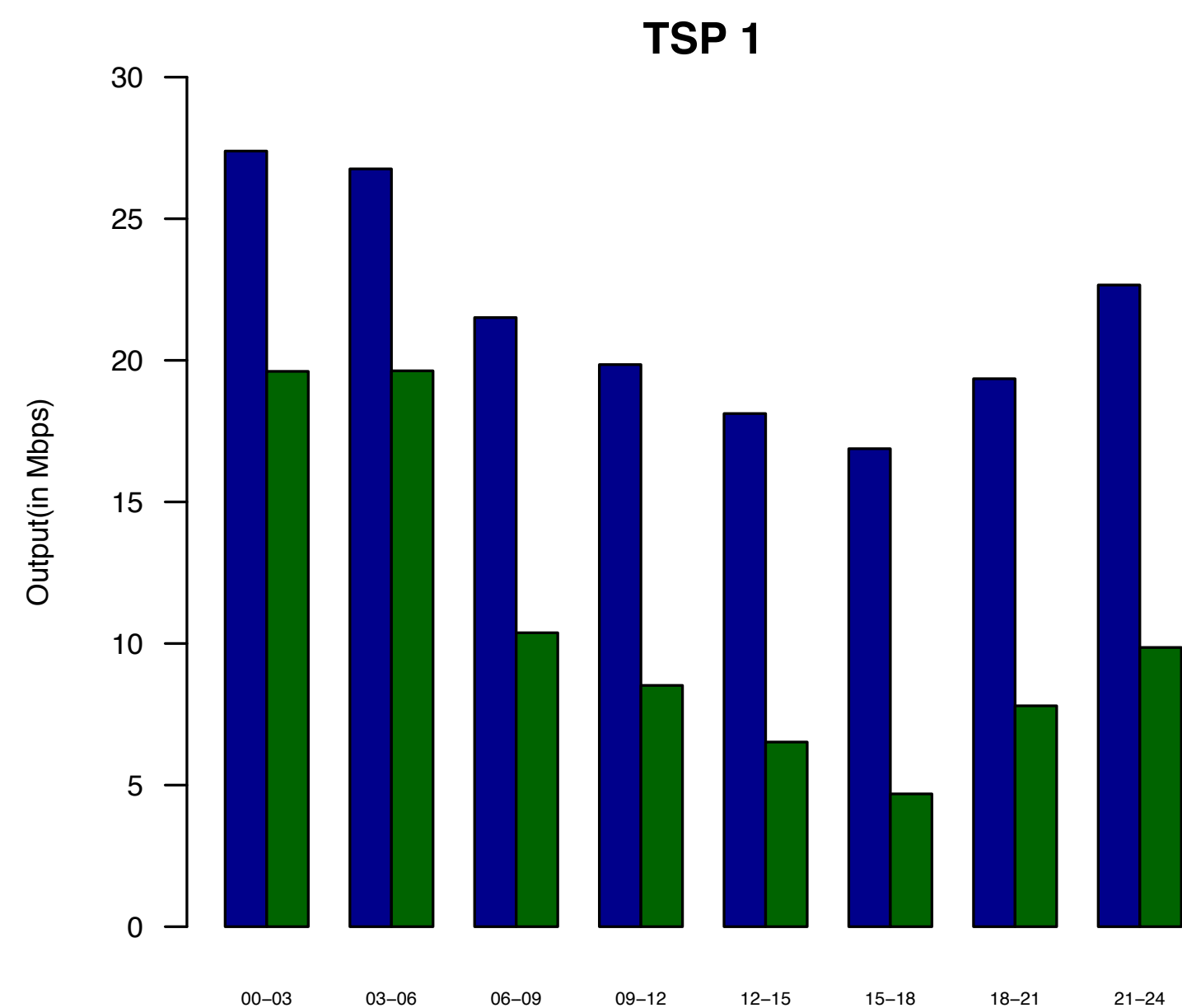
WHITE PAPER DATED 5TH OF FEBRUARY 2018

WIRELESS DATA SPEED MEASUREMENT

QoS Benchmarks for Wireless Data Speed

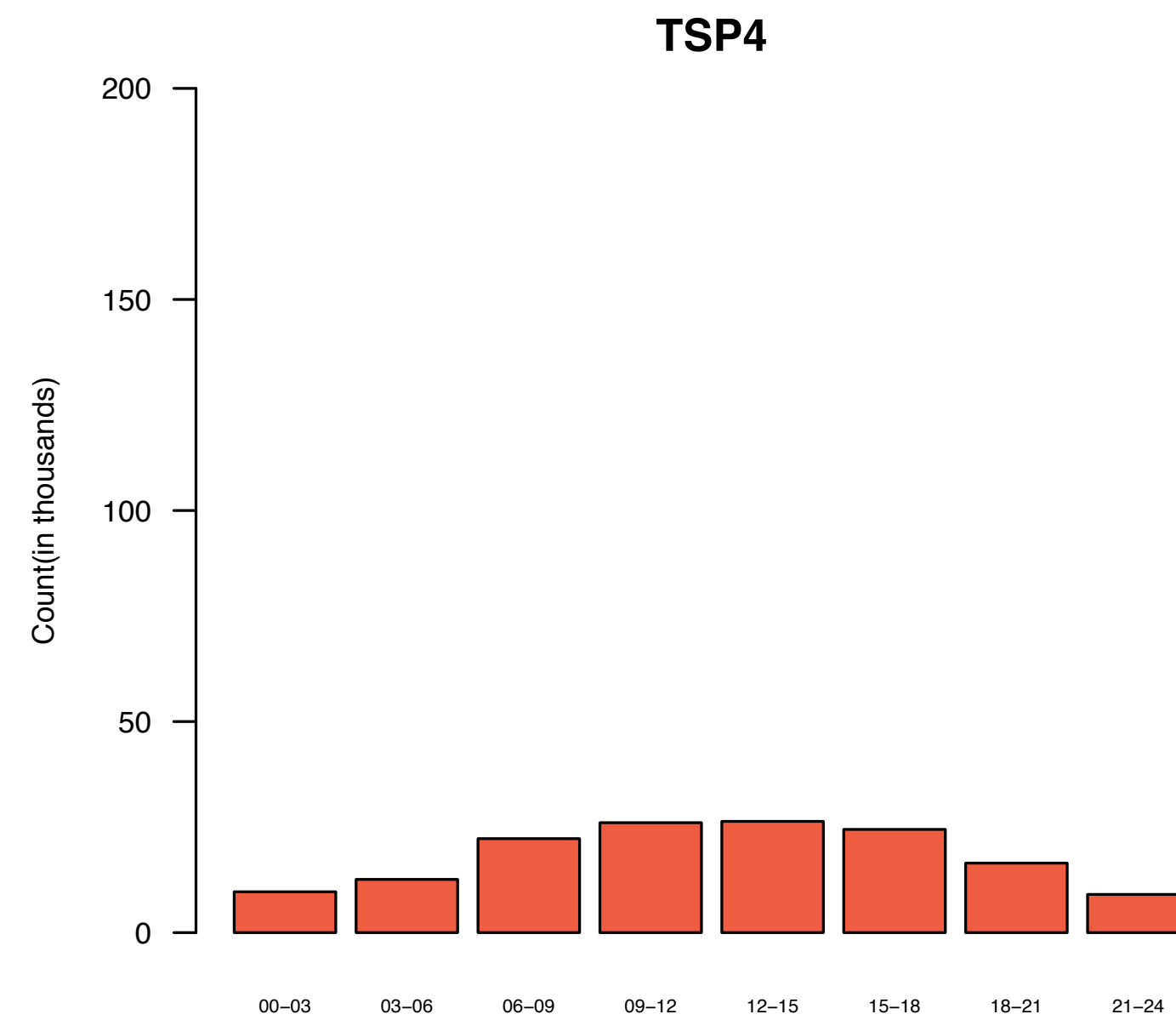
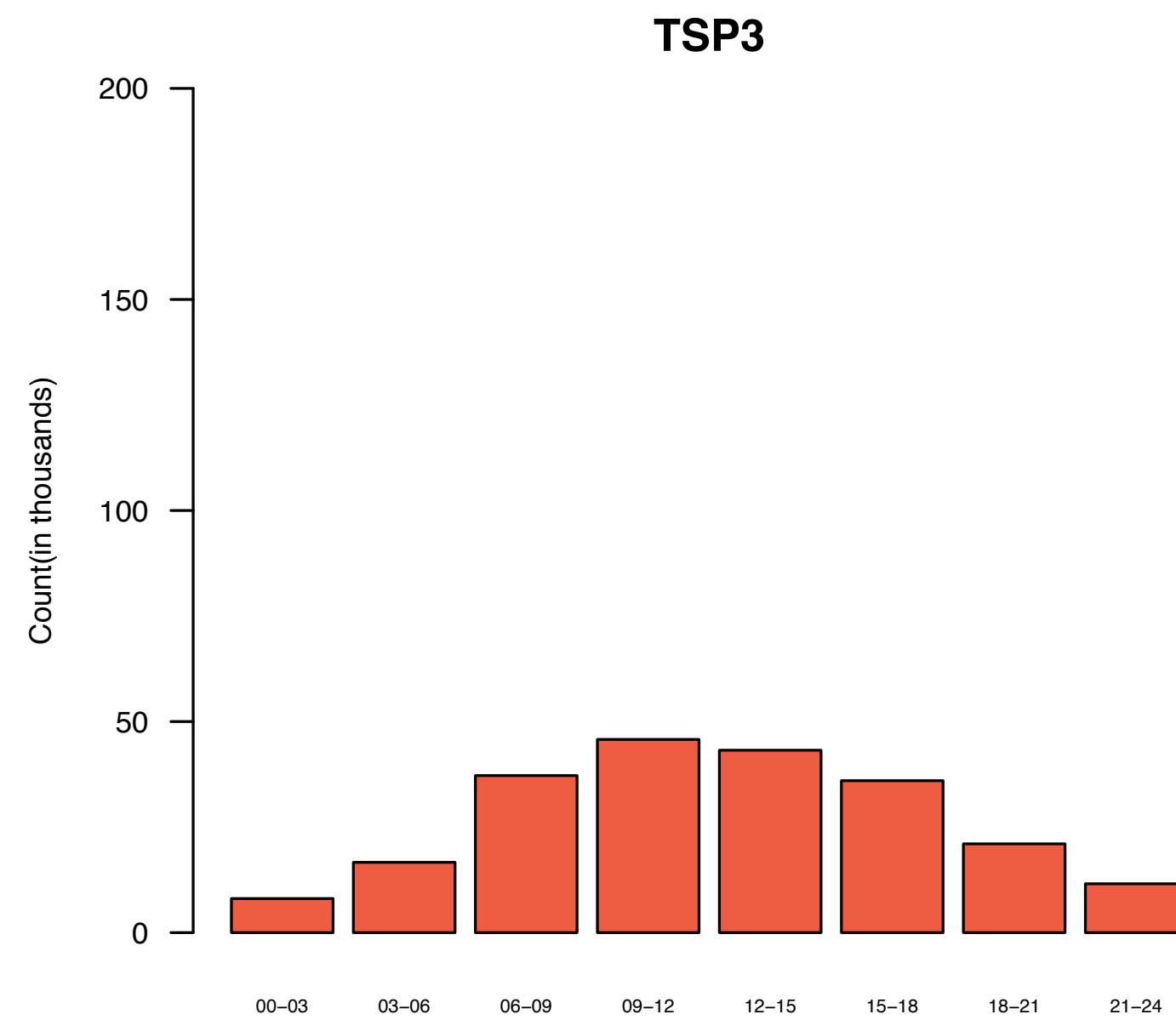
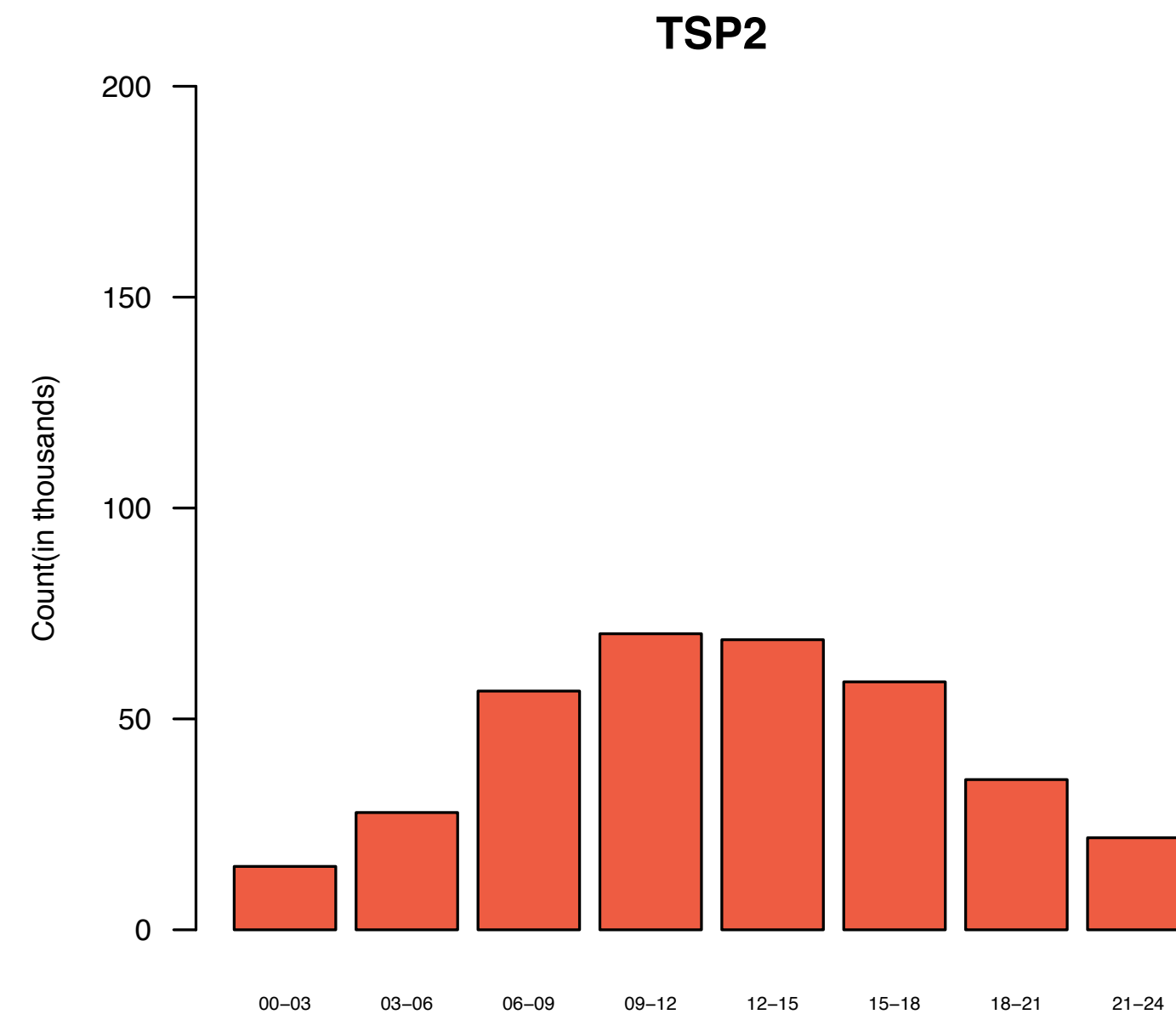
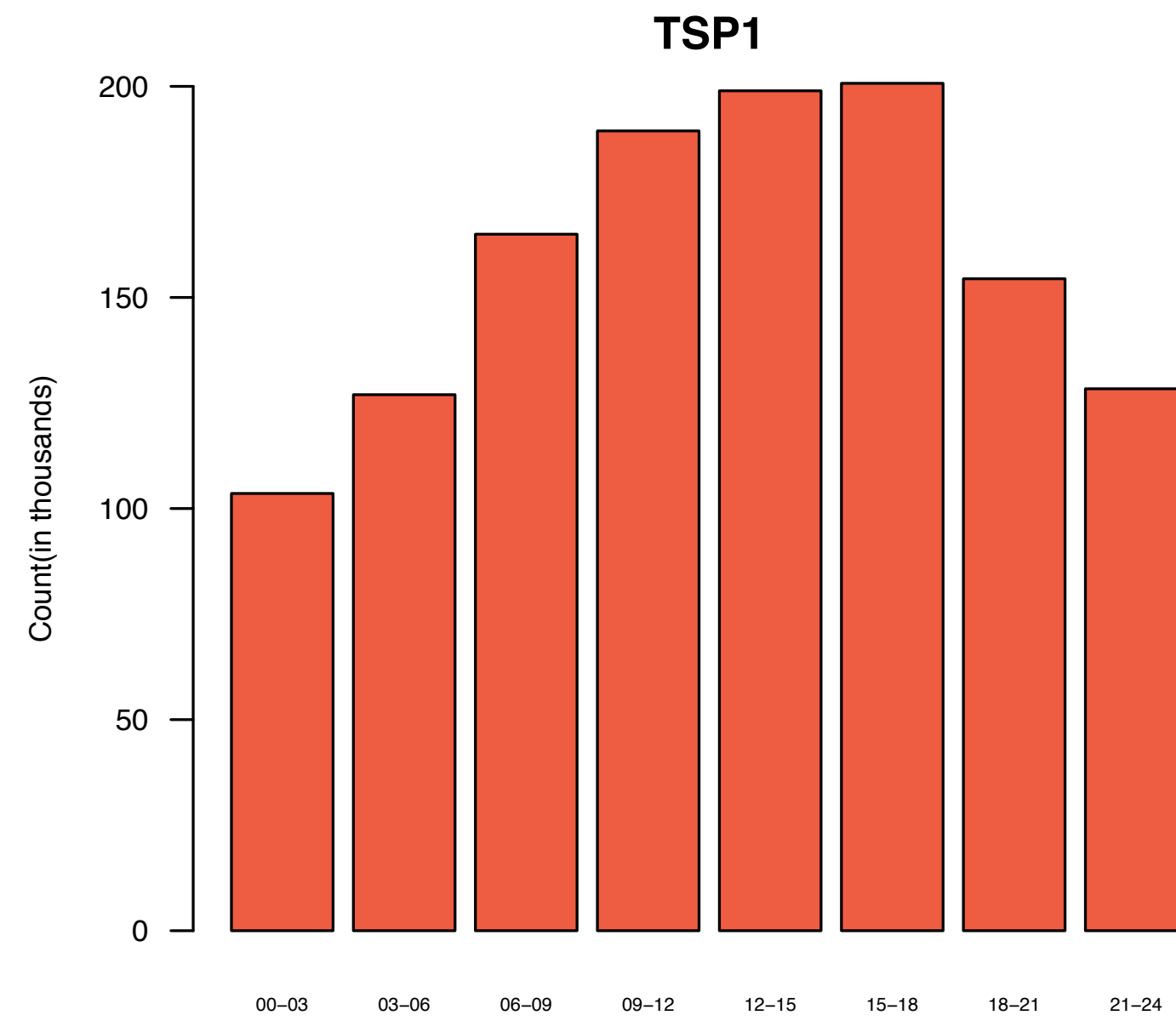
S. No.	Parameter	Benchmark
1	Service Activation/ Provisioning	Within 4 hrs 95% Success Rate
2	Successful Data Transmission Download Attempts	>80%
3	Successful Data Transmission Upload Attempts	>75%
4	Minimum Download Speed	To be measured for each plan and Reported to TRAI
5	Average Throughput for packet data	>75% of the subscribed speed
6	Latency	Data<250 ms
7	PDP Context Activation Success Rate	>95%
8	Drop Rate	<5%

Throughput experiences of four TSPs across time (Manual test)

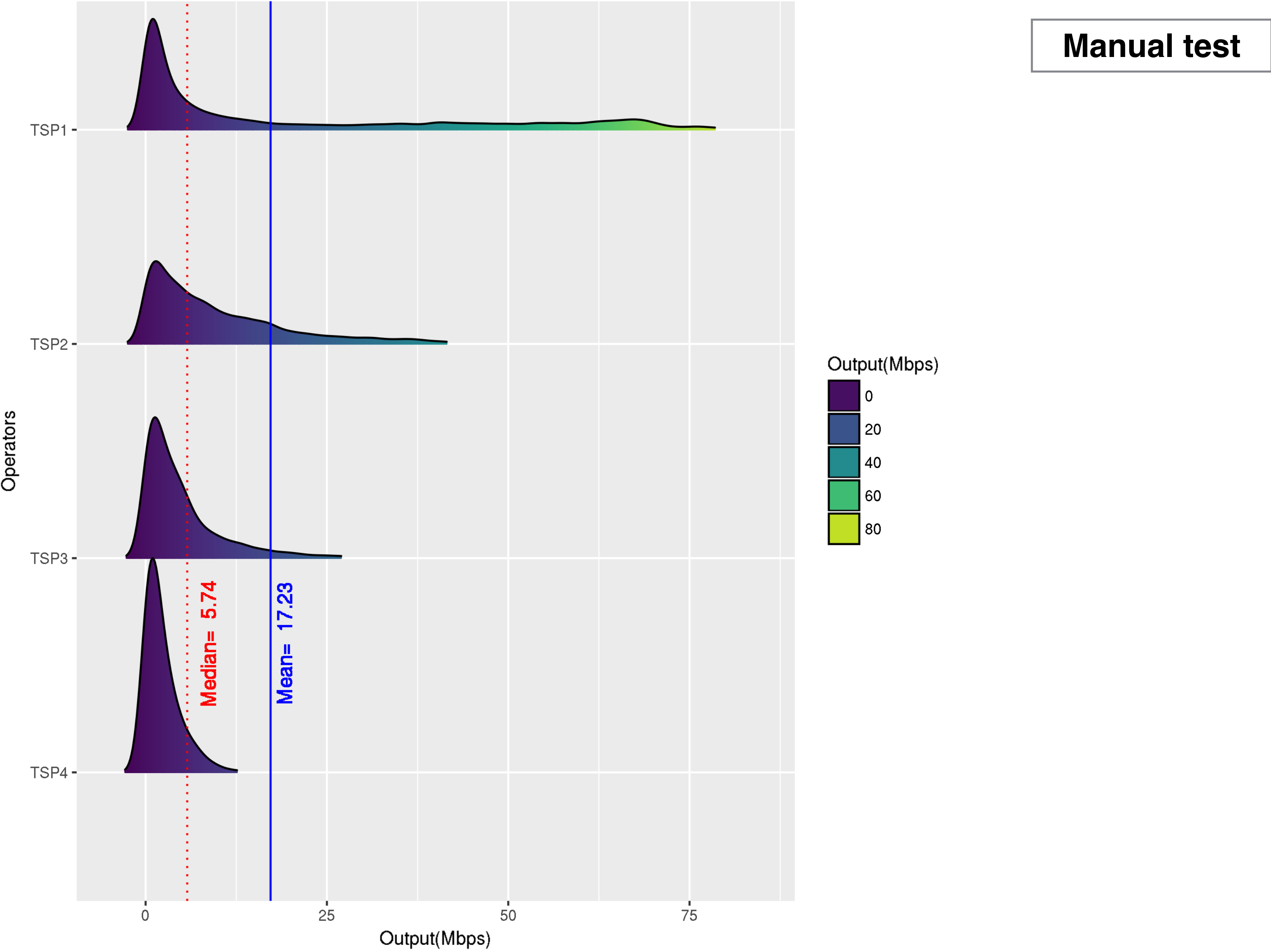


■ Average
■ Median

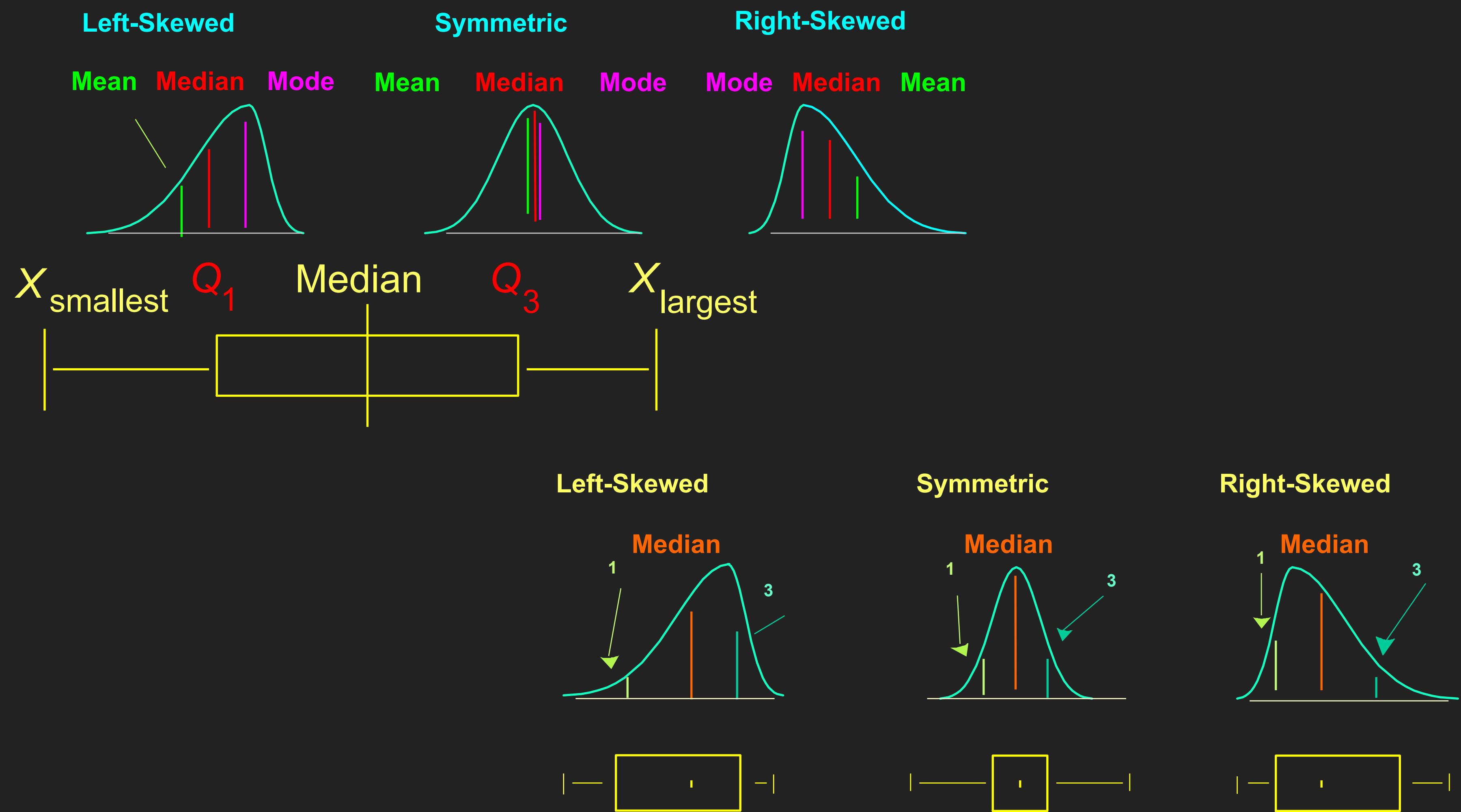
Distribution of sample of four TSPs across time (Manual test)



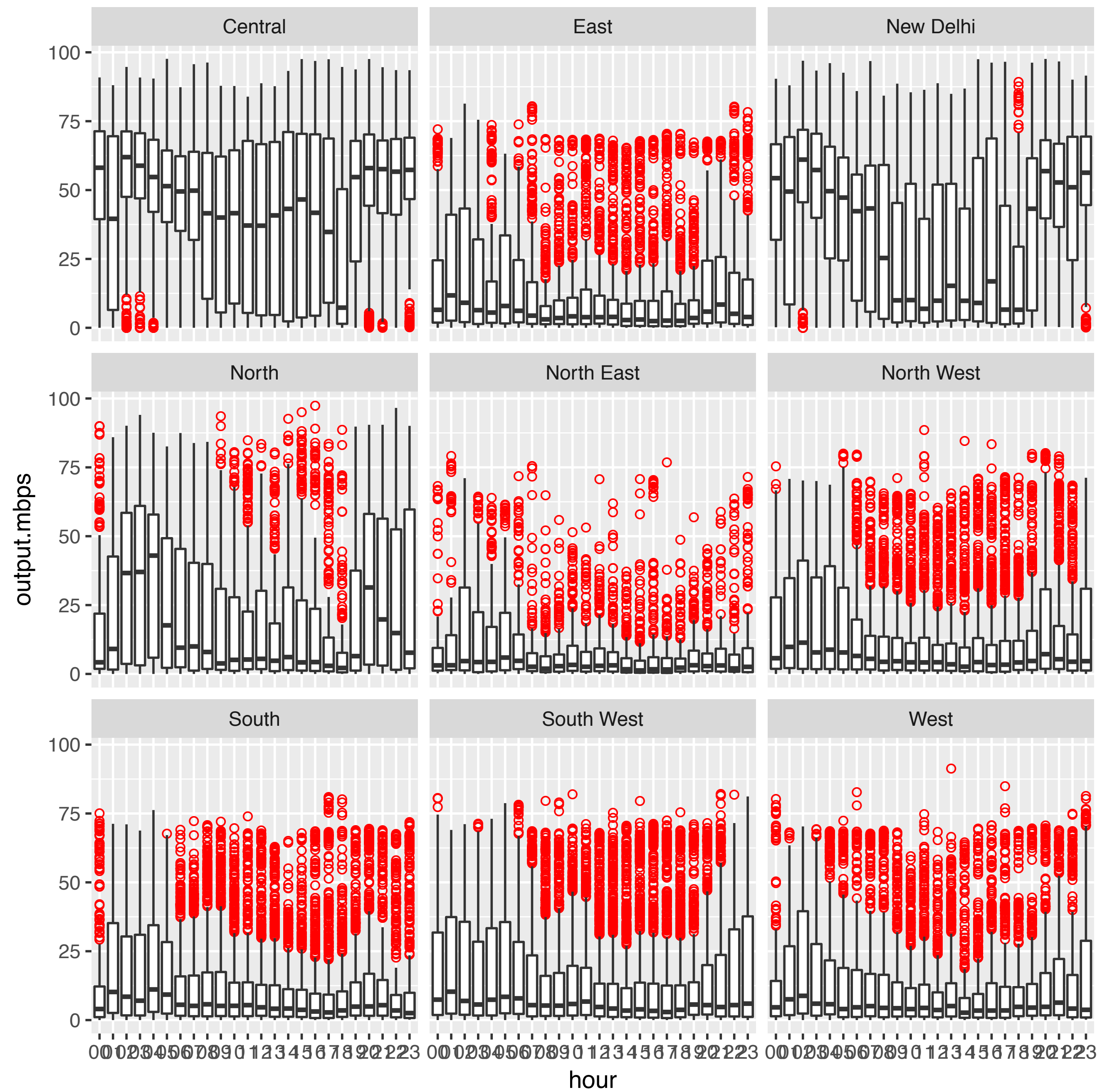
Kernel Density plot



BOX AND WHISKER PLOT



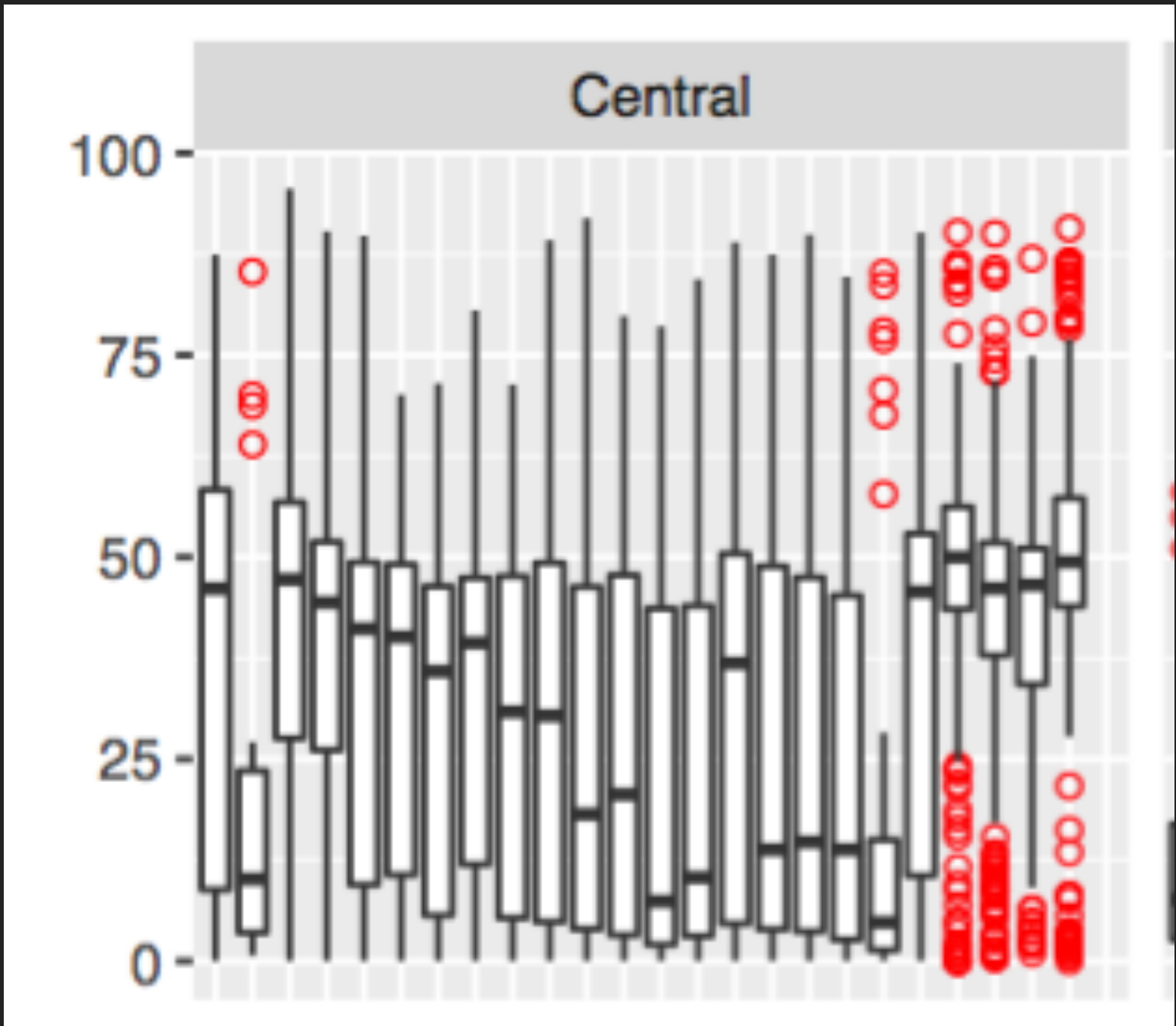
District wise Box and Whiskers plot for Delhi (Manual test)



BOX PLOT BASED DETERMINATION OF SPEEDS

AREA: CENTRAL DELHI

TIME PERIOD: AUG-OCT2017



FOR AN AREA, WE HAVE

- ▶ 24 values of Median
- ▶ 24 values of Upper Quartile
- ▶ 24 values of Lower Quartile
- ▶ 24 values of Highest
- ▶ 24 values of Lower

CAN WE HAVE

5-POINT SUMMARY FOR AREA

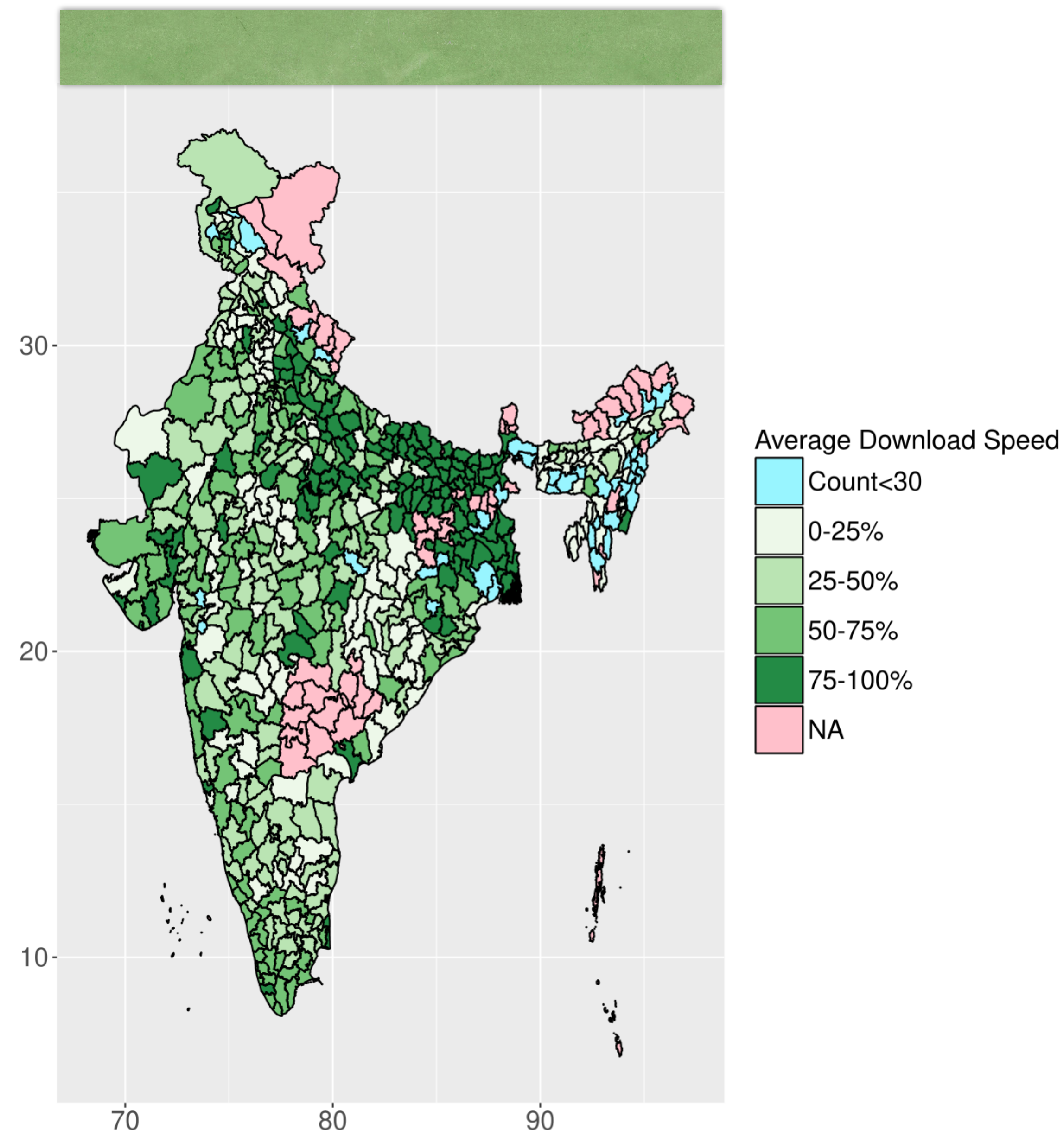
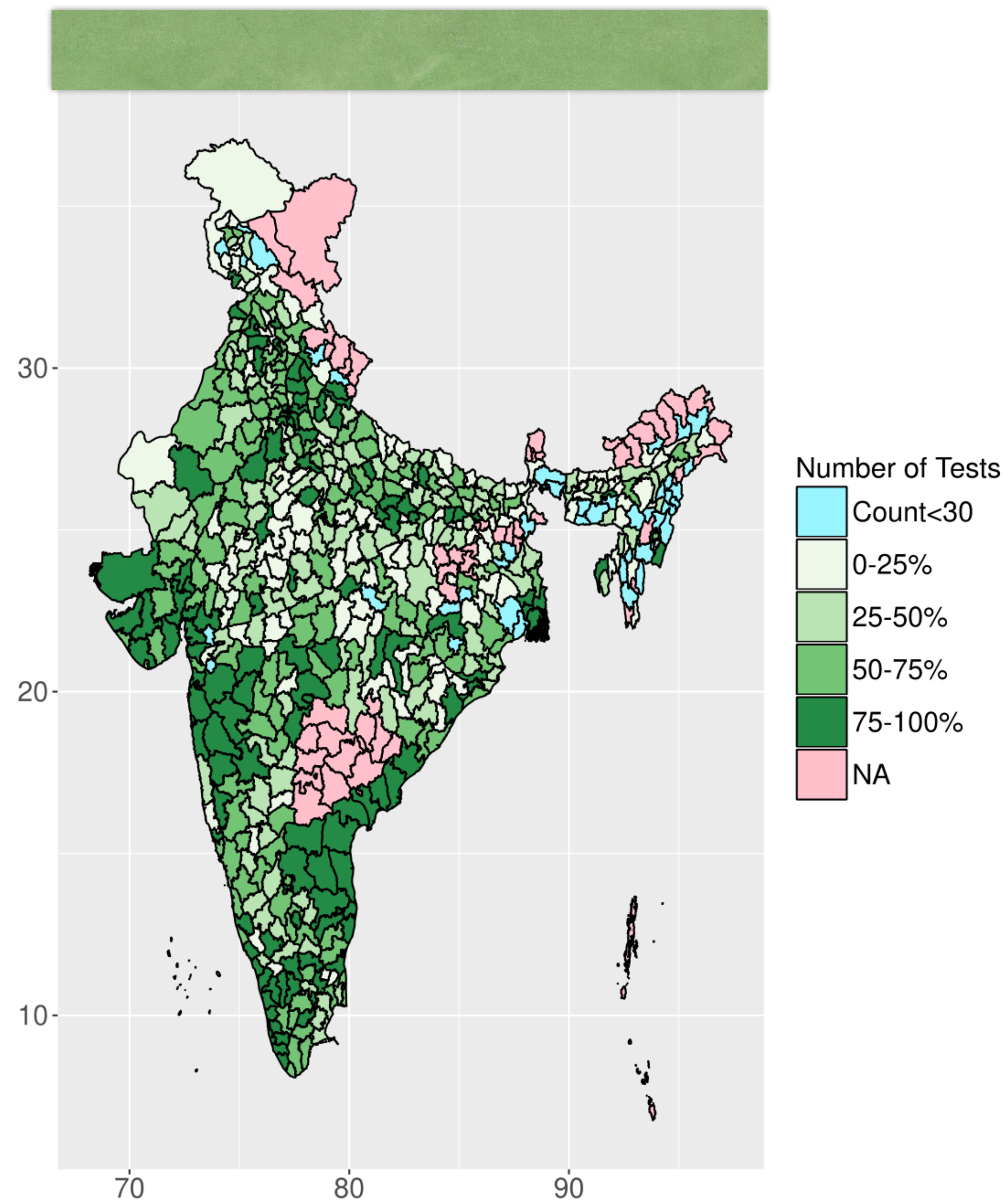
Q_1 Median Q_3

Q_1 Median Q_3

Q_1 Median Q_3

Q_1 Median Q_3

Q_1 Median Q_3



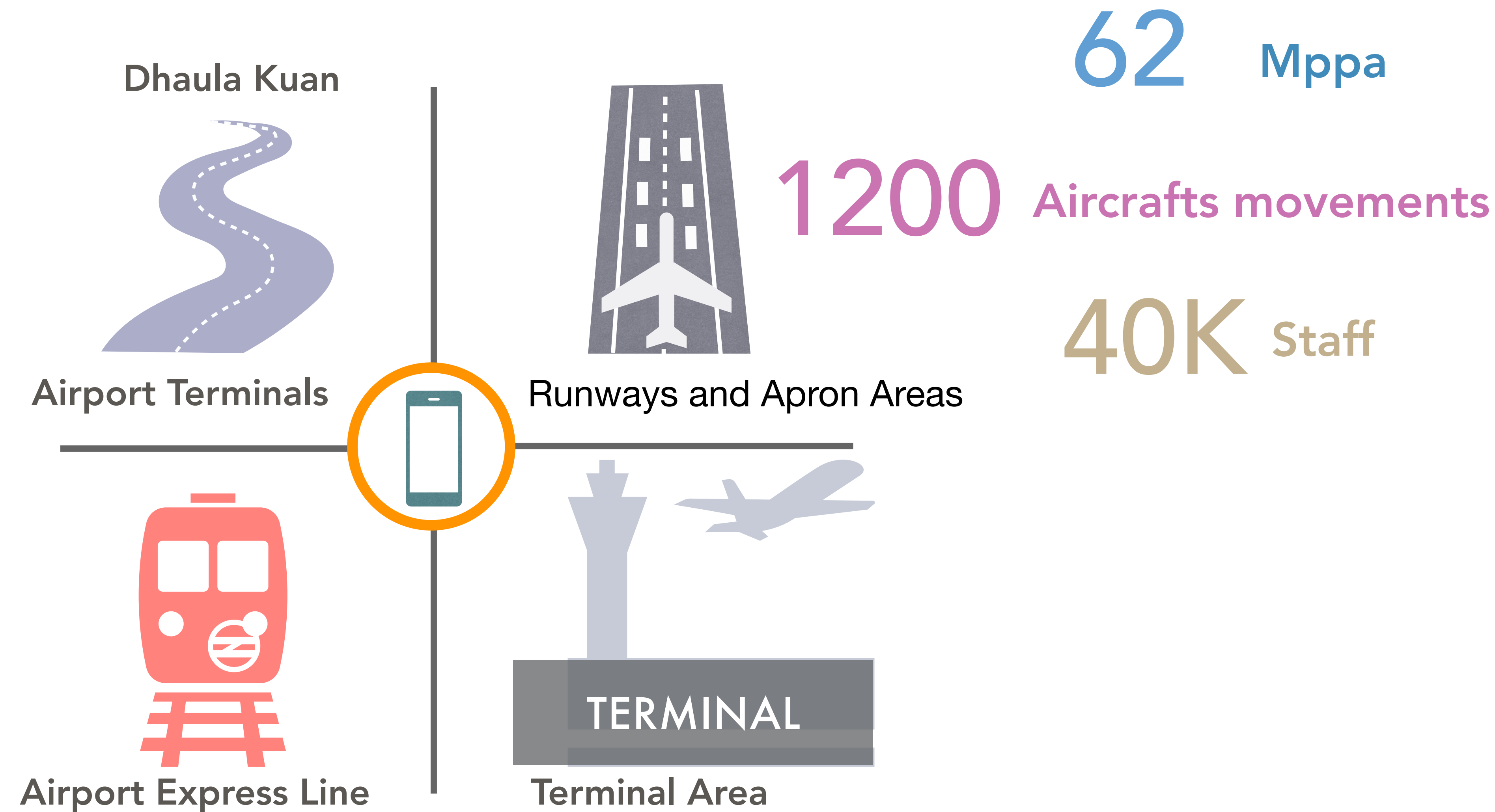
MEAN OPINION SCORE

DRIVE TEST

DRIVE TESTS

- Independent **Drive Tests** are conducted
 - 70 cities in a year
 - Highways and Railway tracks
- Only for transparency, No Financial Disincentives

Case Study: Airport & Metro Train Area



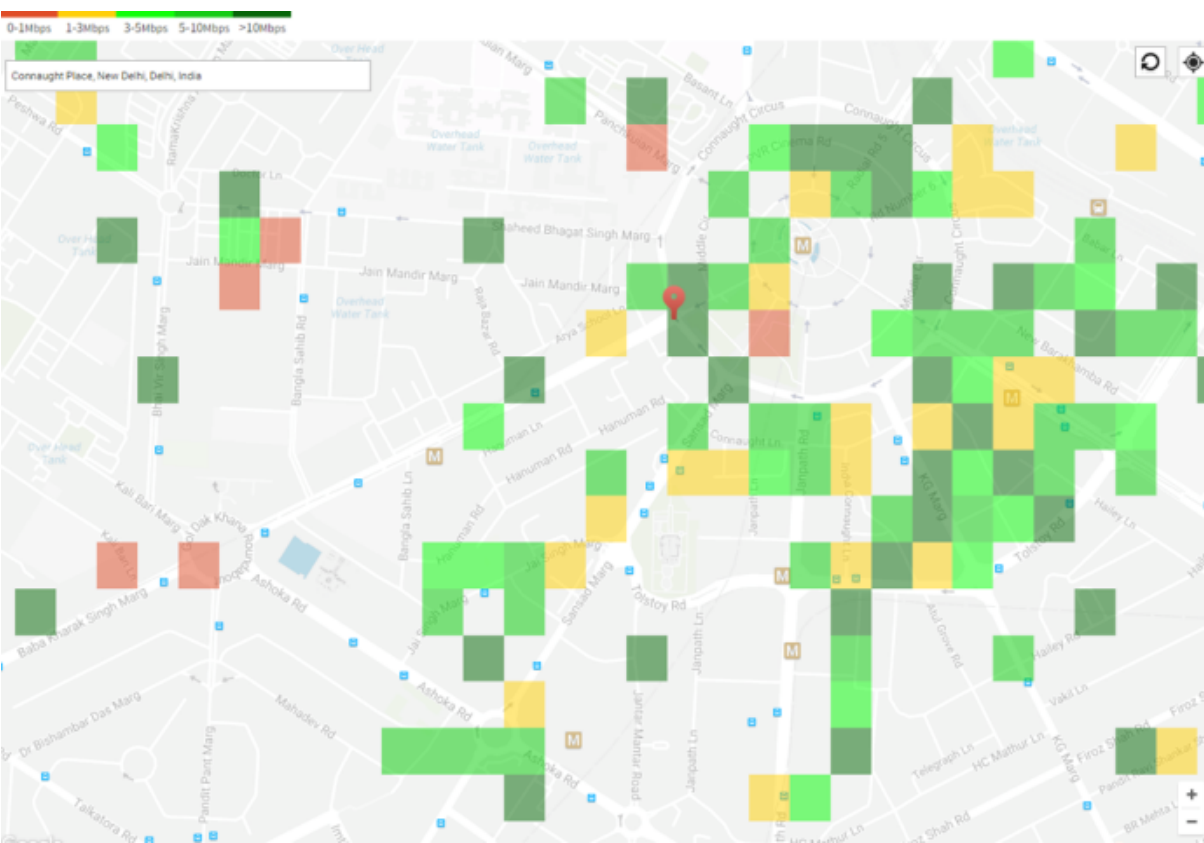
Poor QoS inside the Residential Buildings

- Permission to install infrastructure is given by Residential Welfare Associations (RWAs)
- Rent seeking models by Infrastructure Providers
- EMF apprehensions
- Illegal repeaters
- Jammers

Approach to improve QoS

- Case Study approach
 - Identify systematic issues and take remedial measures
- Co-construct
 - Instead of seeing as monetisation opportunity by other sectors there is a need to collaborate

Thanks



Crowd Sourced Data

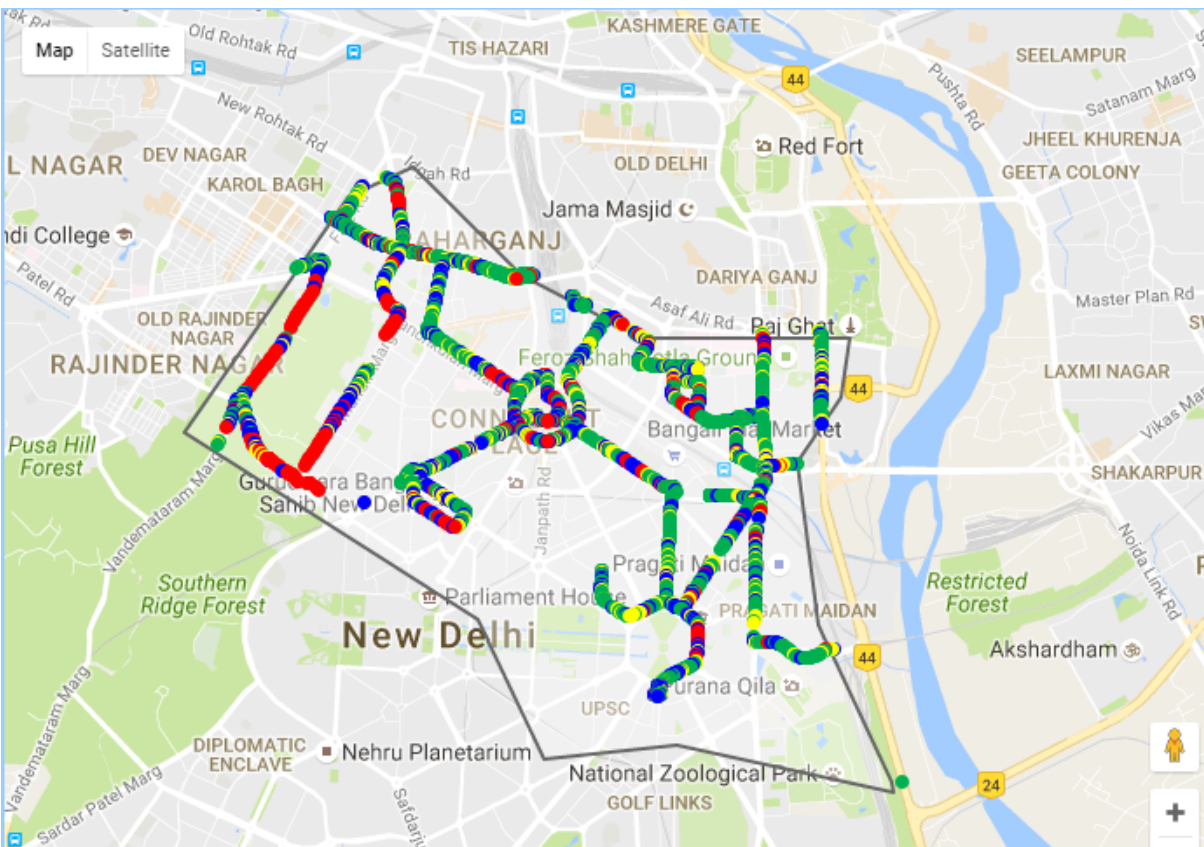
Other Crowd Sources (Data)

- Passive App
- Data Speed Feedback
- Environment Inputs
- Regular feedback from Railway/ Bus

RF Drive Tests

To corroborate observations

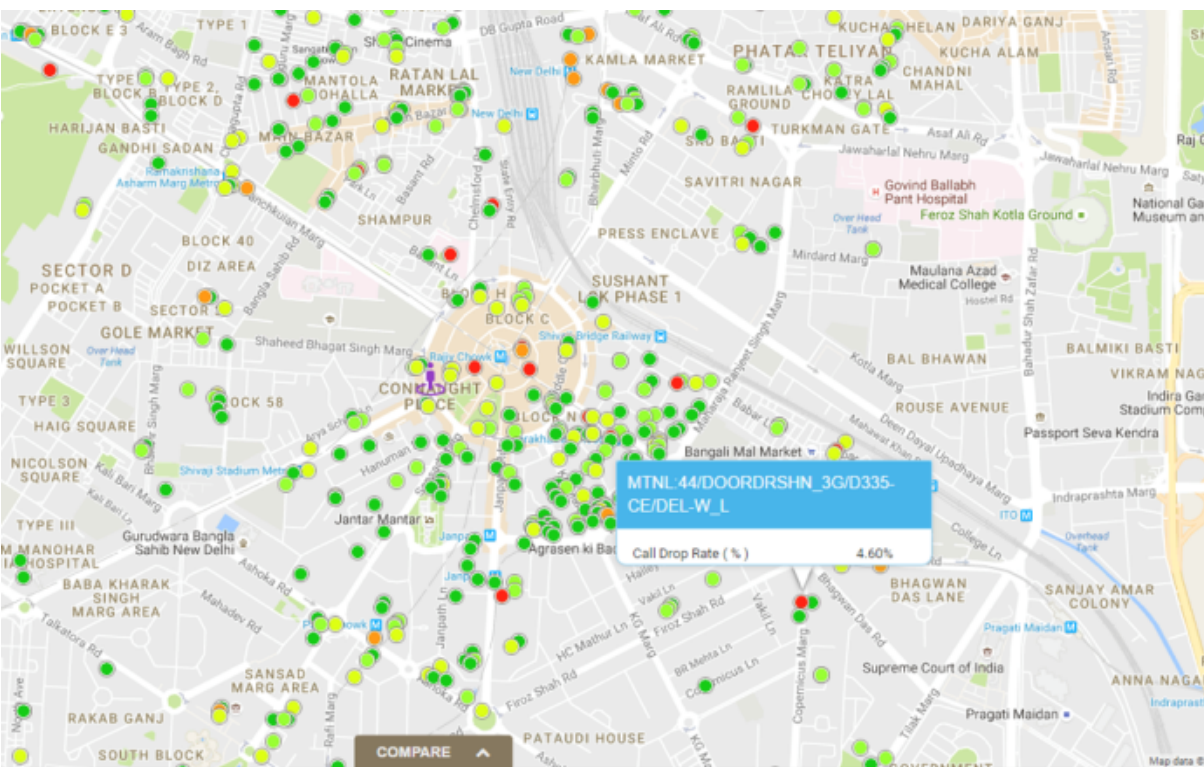
- Identified Problem Areas e.g. CRM, CDR Analysis
- Enhanced RF Drive Test including Active/ Passive Tests of Data and Voice
- Environment Inputs



Network KPIs

To correlate observations

- Identified Problem Areas
- Enhanced RF Drive Test including Active/ Passive Tests of Data and Voice
- Environment Inputs



Network KPIs

S.No.	Name of Parameter	Benchmark
(i)	Network Availability	
	(a) BTSs and eNode Bs Accumulated downtime (not available for service)	$\leq 2\%$
	(b) Worst affected BTSs and eNode Bs due to downtime	$\leq 2\%$
(ii)	Connection Establishment (Accessibility)	
	(a) Call Set-up Success Rate (within licensee's own network) Session Establishment Success Rate	$\geq 95\%$
	(b) SDCCH/ Paging Channel and RRC Congestion	$\leq 1\%$
	(c) TCH and Packet Switched E-RAB Congestion	$\leq 2\%$
(iii)	Connection Maintenance (Retainability)	
	(a) Call Drop and Voice over LTE Drop (IMS Session) Rate	$\leq 2\%$
	(b) Worst affected cells having more than 3% TCH drop (call drop) and Circuit Switched Voice Drop rate and Voice over LTE Drop (IMS Session)	$\leq 3\%$
	(c) connections with good voice quality and Voice over LTE Quality	$\geq 95\%$
(iv)	Point of Interconnection (POI) Congestion (on individual POI)	$\leq 0.5\%$

Parameters for Customer Service Quality

S.No.	Name of Parameter	Benchmark	Averaged
Customer Service Quality Parameters			
(v)	Metering and billing credibility – post paid	Not more than 0.1% of bills issued should be disputed over a billing cycle	One Billing Cycle
(vi)	Metering and billing credibility – pre-paid	Not more than 1 complaint per 1000 customers	One Quarter
(vii)	(a) Resolution of billing/ charging complaints	98% within 4 weeks and 100% within 6 weeks	One Quarter
	(b) Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	within 1 week of resolution of complaint	One Quarter
(viii)	Response Time to the customer for assistance		
	(a) Accessibility of call centre/ customer care	≥ 95%	One Quarter
	(b) Percentage of calls answered by the operators(voice to voice) within 90 seconds	≥ 95%	One Quarter
(ix)	Termination/ closure of service	≤ 7 days	One Quarter
(x)	Time taken for refund of deposits after closures	100% within 60 days	One Quarter

Drop Call Rate (DCR) of a Cell

Operator-1

Delhi

Jan-March 2019

