

GRP Project – Documentation of Work Done

Data used for implementation

- Cell ID chart of IDEA, Madhya Pradesh
- CDR data of phone no. 9644346975 (IDEA operator)
- Railway network of MP
- Railway Stations of MP

Two python scripts and QGIS functions are run to achieve the required result. They are given below in sequence in which they should be run

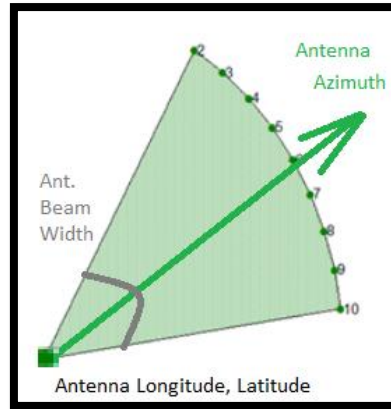
1) mobnet_read2_idea.py

This takes in csv file of IDEA Cell ID chart for MP region as input. The file used is “Idea.csv”. Below shown is screenshot of how this file looks before processing

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	CellID	Site	IMID of Site	Zone	District	Town	Site Name	CGI1	LAT	LONG	TEHSIL	Network_	Address	AZIMUTH
2	AACHR1A	AACHR1	IMRPR_10811_15U	RAIPUR-2	DURG	ACHHOLI	(ACHHOLI (ANDA)	404-78-40011-29121	21.08026	81.25021	DURG	2	SHRI VILL.	80
3	AACHR1B	AACHR1	IMRPR_10811_15U	RAIPUR-2	DURG	ACHHOLI	(ACHHOLI (ANDA)	404-78-40011-29122	21.08026	81.25021	DURG	2	SHRI VILL.	150
4	AACHR1C	AACHR1	IMRPR_10811_15U	RAIPUR-2	DURG	ACHHOLI	(ACHHOLI (ANDA)	404-78-40011-29123	21.08026	81.25021	DURG	2	SHRI VILL.	270
5	AARAR1A	AARAR1	IMBIL_03137	AMBIKAPI	JASHPUR	AARRA	AARRA	404-78-30985-64801	22.82555	84.26666	JASHPUR	2	MR. MOTI	0
6	AARAR1B	AARAR1	IMBIL_03137	AMBIKAPI	JASHPUR	AARRA	AARRA	404-78-30985-64802	22.82555	84.26666	JASHPUR	2	MR. MOTI	120
7	AARAR1C	AARAR1	IMBIL_03137	AMBIKAPI	JASHPUR	AARRA	AARRA	404-78-30985-64803	22.82555	84.26666	JASHPUR	2	MR. MOTI	240
8	ABDAB1A	ABDAB1	IMBPL_30101	GUNA	RAJGARH	ABADA	ABADA	404-78-38005-62911	23.49295	76.77338	NARSINGH	2	MR. KAMA	0
9	ABDAB1B	ABDAB1	IMBPL_30101	GUNA	RAJGARH	ABADA	ABADA	404-78-38005-62912	23.49295	76.77338	NARSINGH	2	MR. KAMA	110
10	ABDAB1C	ABDAB1	IMBPL_30101	GUNA	RAJGARH	ABADA	ABADA	404-78-38005-62913	23.49295	76.77338	NARSINGH	2	MR. KAMA	260
11	ABDAR1A	ABDAR1	IMRPR_14819_15U	RAIPUR-1	KANKER	ALBEDA	ALBEDA	404-78-40027-54811	20.28	81.36	KANKER	2	SHRI RAM	50
12	ABDAR1B	ABDAR1	IMRPR_14819_15U	RAIPUR-1	KANKER	ALBEDA	ALBEDA	404-78-40027-54812	20.28	81.36	KANKER	2	SHRI RAM	215
13	ABDAR1C	ABDAR1	IMRPR_14819_15U	RAIPUR-1	KANKER	ALBEDA	ALBEDA	404-78-40027-54813	20.28	81.36	KANKER	2	SHRI RAM	300
14	ABDAR2A	ABDAR2	IMRPR_14819_15UR	RAIPUR-1	UTTAR BA	ALBEDA	ALBEDA	404-78-30982-54821	20.28002	81.36067	UTTAR BA	2	ATC TOWE	60
15	ABDAR2B	ABDAR2	IMRPR_14819_15UR	RAIPUR-1	UTTAR BA	ALBEDA	ALBEDA	404-78-30982-54822	20.28002	81.36067	UTTAR BA	2	ATC TOWE	260
16	ABDAR2C	ABDAR2	IMRPR_14819_15UR	RAIPUR-1	UTTAR BA	ALBEDA	ALBEDA	404-78-30982-54823	20.28002	81.36067	UTTAR BA	2	ATC TOWE	330
17	ABDIB1A	ABDIB1	IMBPL_33143	BHOPAL	SEHORE	ABIDABAI	ABIDABAD	404-78-36000-30371	23.05175	77.29361	ICHHAWA	2	RELIANCE	10
18	ABDIB1B	ABDIB1	IMBPL_33143	BHOPAL	SEHORE	ABIDABAI	ABIDABAD	404-78-36000-30372	23.05175	77.29361	ICHHAWA	2	RELIANCE	135
19	ABDIB1C	ABDIB1	IMBPL_33143	BHOPAL	SEHORE	ABIDABAI	ABIDABAD	404-78-36000-30373	23.05175	77.29361	ICHHAWA	2	RELIANCE	260
20	ABER1A	ABER1	IMREW_13051	REWA	SATNA	ABER	ABER	404-78-50031-10011	24.69724	81.02291	RAMPUR-I	2	LAXMAN H	350
21	ABER1B	ABER1	IMREW_13051	REWA	SATNA	ABER	ABER	404-78-50031-10012	24.69724	81.02291	RAMPUR-I	2	LAXMAN H	100
22	ABER1C	ABER1	IMREW_13051	REWA	SATNA	ABER	ABER	404-78-50031-10013	24.69724	81.02291	RAMPUR-I	2	LAXMAN H	220

This python script generates coverage polygons for each antenna on every mobile.

For each antenna on a mobile tower, we use two azimuth values on either side of its orientation (azimuth angle) to fix the beam-width (see figure for meaning of beam-width). The two azimuth values are calculated as orientation of angle bisector with adjacent antennas.



The radius of coverage has been fixed to a constant value here. However, it is not accurate and this value should be calculated based on nearest mobile tower distance.

Following new attributes are generated in processing are

- Sector_Radius – Distance upto which antenna covers a region (taken fixed as mentioned above)
- wkt – Two long-lat pairs on either side of antenna orientation marking end-points of coverage polygon
- SectorNum – Antenna number on a mobile tower. For ex, if tower has 4 antennas then SectorNum for that tower (or site) varies from 1 to 4
- Angle – Angle 1 value (in clockwise direction) for that antenna.
Angle 2 value (in anticlockwise direction) is Angle 1 value of adjacent antenna
- nwkt – Entries of format “POLYGON((starting point long-lat, end point_1 long-lat, end point_2 long-lat, starting point long-lat))” specifying coverage polygon for each antenna

The nwkt attribute has been created in above format so that the polygon can be visualized in QGIS platform. Thereafter, intersection of these polygons with railway network gives the required database i.e. which antenna covers which railway network.

At the end of this step we obtain a new excel file containing old and new attributes as mentioned above. The file name is “mobnet_processed_idea.csv”

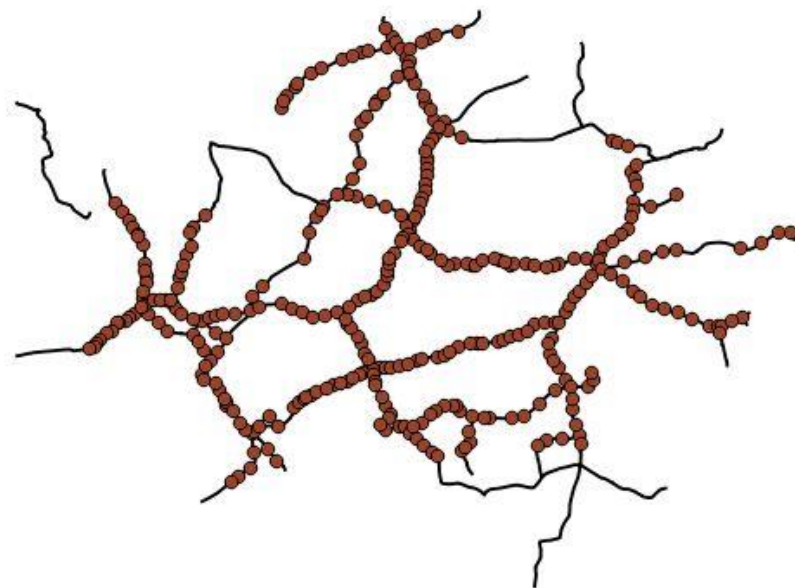
CellID	SheName	Dist	Lat	Long	Azimuth	Zone	District	Sector_F_wkt	Sector_M_Angle	lat1	lon1	lat2	lon2	nrwk		
1	SUKMA1	SUKMA1	404-78-	18.39	81.653	25	RAIPUR-DANTEW	10	81.7460	1	87	18.425	81.746	18.416	81.568	POLYGON((81.658892 18.38951, 81.746050543 18.4245903241, 81.5683483707 18.4167529256, 81.658892 18.38951))
2	SUKMA1	SUKMA1	404-78-	18.39	81.653	110	RAIPUR-DANTEW	10	81.6988	2	155	18.308	81.639	18.425	81.746	POLYGON((81.658892 18.38951, 81.6388808421 18.3080903404, 81.746050543 18.4245903241, 81.658892 18.38951))
3	SUKMA1	SUKMA1	404-78-	18.39	81.653	200	RAIPUR-DANTEW	10	81.5683	3	287	18.416	81.568	18.308	81.639	POLYGON((81.658892 18.38951, 81.5683483707 18.4167529256, 81.6388808421 18.3080903404, 81.658892 18.38951))
4	KRNIA	KRNIA	404-78-	18.634	81.254	60	RAIPUR-DANTEW	10	81.3486	1	90	18.634	81.349	18.599	81.167	POLYGON((81.25385 18.63366, 81.348654512 18.636362542, 81.1666028143 18.5985391778, 81.25385 18.63366))
5	KRNIA	KRNIA	404-78-	18.634	81.254	120	RAIPUR-DANTEW	10	81.2903	2	152	18.554	81.230	18.634	81.349	POLYGON((81.25385 18.63366, 81.2303358516 18.554337704, 81.348654512 18.636362542, 81.25385 18.63366))
6	KRNIA	KRNIA	404-78-	18.634	81.254	185	RAIPUR-DANTEW	10	81.3486	3	247	18.599	81.167	18.554	81.230	POLYGON((81.25385 18.63366, 81.1666028143 18.5985391778, 81.2303358516 18.554337704, 81.25385 18.63366))
7	KUKARI	KUKARI	404-78-	18.635	81.732	50	RAIPUR-BASTAR	10	81.6255	1	80	18.651	81.626	18.709	81.678	POLYGON((81.25385 18.63366, 81.625529187 18.6509094614, 81.677822118 18.709918108, 81.7322222 18.6353333))
8	KUKARI	KUKARI	404-78-	18.635	81.732	110	RAIPUR-BASTAR	10	81.7404	2	175	18.546	81.74	18.651	81.626	POLYGON((81.7322222 18.6353333, 81.7404804501 18.545842385, 81.625529187 18.6509094614, 81.7322222 18.6353333))
9	KUKARI	KUKARI	404-78-	18.635	81.732	240	RAIPUR-BASTAR	10	81.6778	3	325	18.709	81.678	18.546	81.74	POLYGON((81.7322222 18.6353333, 81.677822118 18.709918108, 81.7404804501 18.545842385, 81.7322222 18.6353333))
10	ENGLCH	ENGLCH	404-78-	18.641	81.255	20	RAIPUR-DAKSHIN	10	81.3443	1	70	18.612	81.344	18.639	81.183	POLYGON((81.25524 18.64089, 81.3443441432 18.618333780, 81.1823200589 18.6386383634, 81.25524 18.64089))
11	ENGLCH	ENGLCH	404-78-	18.641	81.255	120	RAIPUR-DAKSHIN	10	81.2552	2	180	18.551	81.255	18.672	81.344	POLYGON((81.25524 18.64089, 81.25524 18.550579505, 81.3443441432 18.618333780, 81.25524 18.64089))
12	ENGLCH	ENGLCH	404-78-	18.641	81.255	240	RAIPUR-DAKSHIN	10	81.1825	3	310	18.639	81.183	18.551	81.255	POLYGON((81.25524 18.64089, 81.1823200589 18.6386383634, 81.25524 18.550579505, 81.25524 18.64089))
13	RIMNRI	RIMNRI	404-78-	18.675	81.232	120	RAIPUR-DANTEW	10	81.3324	1	155	18.533	81.332	18.719	81.21	POLYGON((81.23238 18.67458, 81.332452782 18.5391602708, 81.210279543 18.719478543, 81.23238 18.67458))
14	RIMNRI	RIMNRI	404-78-	18.675	81.232	190	RAIPUR-DANTEW	10	81.2378	2	215	18.601	81.238	18.533	81.332	POLYGON((81.23238 18.67458, 81.2378945755 18.6008960757, 81.332452782 18.5391602708, 81.23238 18.67458))
15	RIMNRI	RIMNRI	404-78-	18.675	81.232	240	RAIPUR-DANTEW	10	81.2321	3	300	18.719	81.21	18.601	81.238	POLYGON((81.23238 18.67458, 81.210279543 18.719478543, 81.2378945755 18.6008960757, 81.23238 18.67458))
16	BOBCL	BOBCL	404-78-	18.696	81.253	40	RAIPUR-DAKSHIN	10	81.3477	1	95	18.689	81.348	18.783	81.223	POLYGON((81.25323 18.69636, 81.3477012527 18.6885069147, 81.2286719 18.783124971, 81.25323 18.69636))
17	BOBCL	BOBCL	404-78-	18.696	81.253	150	RAIPUR-DAKSHIN	10	81.1922	2	220	18.628	81.192	18.689	81.348	POLYGON((81.25323 18.69636, 81.1922950058 18.6275348266, 81.3477012527 18.6885069147, 81.25323 18.69636))
18	BOBCL	BOBCL	404-78-	18.696	81.253	230	RAIPUR-DAKSHIN	10	81.2286	3	345	18.783	81.223	18.628	81.192	POLYGON((81.25323 18.69636, 81.2286719 18.783124971, 81.1922950058 18.6275348266, 81.25323 18.69636))
19	BACHA	BACHA	404-78-	18.702	81.254	180	RAIPUR-DANTEW	10	81.2215	1	200	18.617	81.222	18.788	81.223	POLYGON((81.25402 18.70159, 81.2215639178 18.6177270328, 81.224611375 18.783534366, 81.25402 18.70159))
20	BACHB	BACHB	404-78-	18.702	81.254	220	RAIPUR-DANTEW	10	81.8242	2	255	18.678	81.822	18.617	81.223	POLYGON((81.25402 18.70159, 81.824247195 18.6783175248, 81.224611375 18.783534366, 81.25402 18.70159))
21	BACHC	BACHC	404-78-	18.702	81.254	290	RAIPUR-DANTEW	10	81.2294	3	345	18.788	81.223	18.617	81.223	POLYGON((81.25402 18.70159, 81.224611375 18.7883594966, 81.224611375 18.783124971, 81.25402 18.70159))
22	PIRARI	PIRARI	404-78-	18.771	81.276	120	RAIPUR-DANTEW	10	81.1276	1	180	18.681	81.127	18.816	81.194	POLYGON((81.27618 18.77123, 81.127618 18.6814579505, 81.193708286 18.8161809554, 81.27618 18.77123))
23	PIRARI	PIRARI	404-78-	18.771	81.276	240	RAIPUR-DANTEW	10	81.1937	2	300	18.816	81.194	18.681	81.276	POLYGON((81.27618 18.77123, 81.193708286 18.8161809554, 81.27618 18.6814579505, 81.27618 18.77123))
24	BUJRI	BUJRI	404-78-	18.796	80.817	0	RAIPUR-DANTEW	10	80.9933	1	80	18.941	80.999	18.68	80.785	POLYGON((80.81711 18.79578, 80.99331151 18.9408780032, 80.7846385306 18.800191049, 80.81711 18.79578))
25	BUJRI	BUJRI	404-78-	18.796	80.817	120	RAIPUR-DANTEW	10	80.7846	2	200	18.711	80.785	18.881	80.893	POLYGON((80.81711 18.79578, 80.7846711883 18.711826877, 80.89331151 18.8406780032, 80.81711 18.79578))
26	BUJRI	BUJRI	404-78-	18.796	80.817	320	RAIPUR-DANTEW	10	80.7846	3	340	18.88	80.785	18.711	80.785	POLYGON((80.81711 18.79578, 80.7846385306 18.800191049, 80.7846711883 18.711826877, 80.81711 18.79578))
27	BALOR	BALOR	404-78-	18.877	81.403	70	RAIPUR-DANTEW	10	81.4380	1	90	18.877	81.438	18.366	81.42	POLYGON((81.40311 18.87746, 81.4380485266 18.87743532, 81.419604254 18.3653285713, 81.40311 18.87746))
28	BALOR	BALOR	404-78-	18.877	81.403	110	RAIPUR-DANTEW	10	81.3966	2	190	18.789	81.387	18.877	81.438	POLYGON((81.40311 18.87746, 81.3966327827 18.7889919765, 81.4380485266 18.87743532, 81.40311 18.87746))
29	BALOR	BALOR	404-78-	18.877	81.403	310	RAIPUR-DANTEW	10	81.4196	3	370	18.866	81.42	18.789	81.387	POLYGON((81.40311 18.87746, 81.419604254 18.3653285713, 81.3966327827 18.7889919765, 81.40311 18.87746))
30	MRTRI	MRTRI	404-78-	18.881	81.165	40	RAIPUR-BUAPUR	10	81.2586	1	80	18.896	81.259	18.97	81.173	POLYGON((81.16514 18.88085, 81.2586467381 18.8964258045, 81.173493052 18.970400281, 81.16514 18.88085))
31	MRTRI	MRTRI	404-78-	18.881	81.165	120	RAIPUR-BUAPUR	10	81.1405	2	195	18.794	81.141	18.896	81.259	POLYGON((81.16514 18.88085, 81.1405803036 18.794072332, 81.2586467381 18.8964258045, 81.16514 18.88085))
32	MRTRI	MRTRI	404-78-	18.881	81.165	330	RAIPUR-BUAPUR	10	81.1734	3	365	18.97	81.173	18.794	81.141	POLYGON((81.16514 18.88085, 81.173493052 18.970400281, 81.1405803036 18.794072332, 81.16514 18.88085))

2) QGIS processing

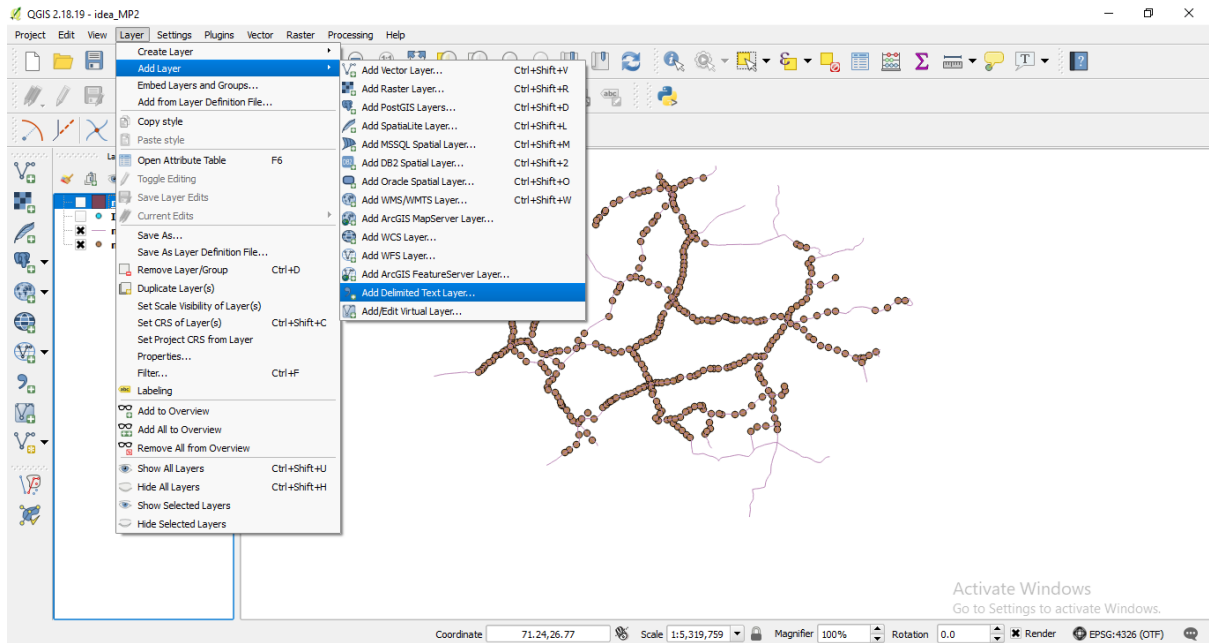
The result file from previous step **“mobnet_processed_idea.csv”** is opened in QGIS making use of wkt functionality in QGIS and **“Intersection”** operation is performed between this imported layer and railway line layer.

Step by step procedure is as follows :

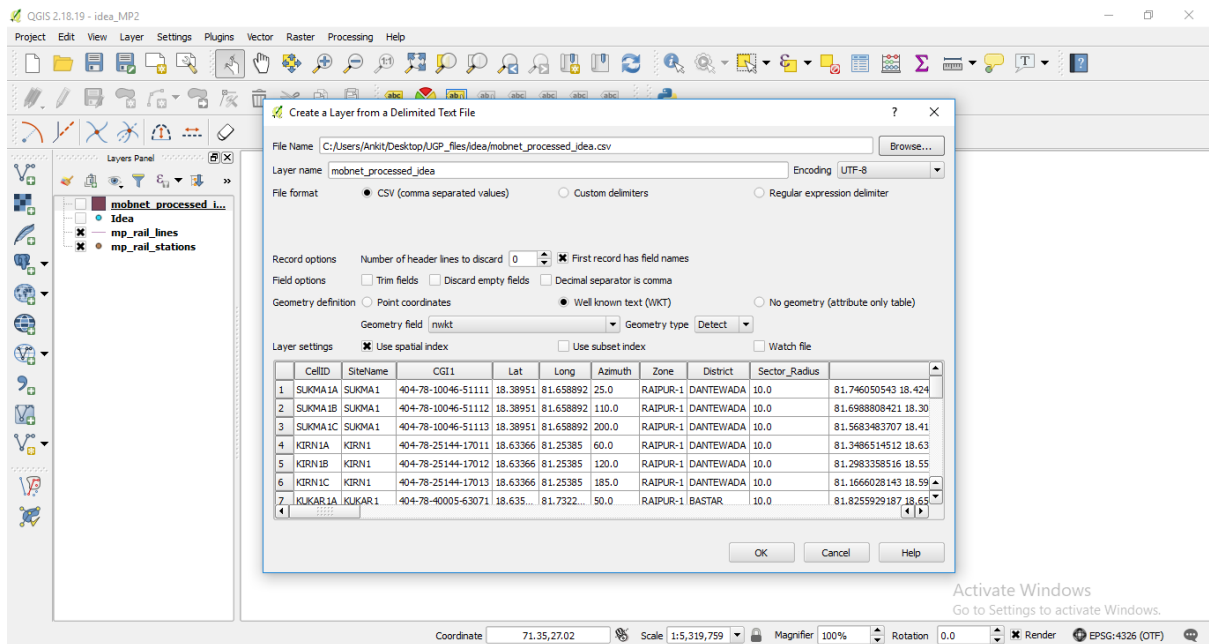
- Open the railway network and railway station shape file for Madhya Pradesh. The visualization is below



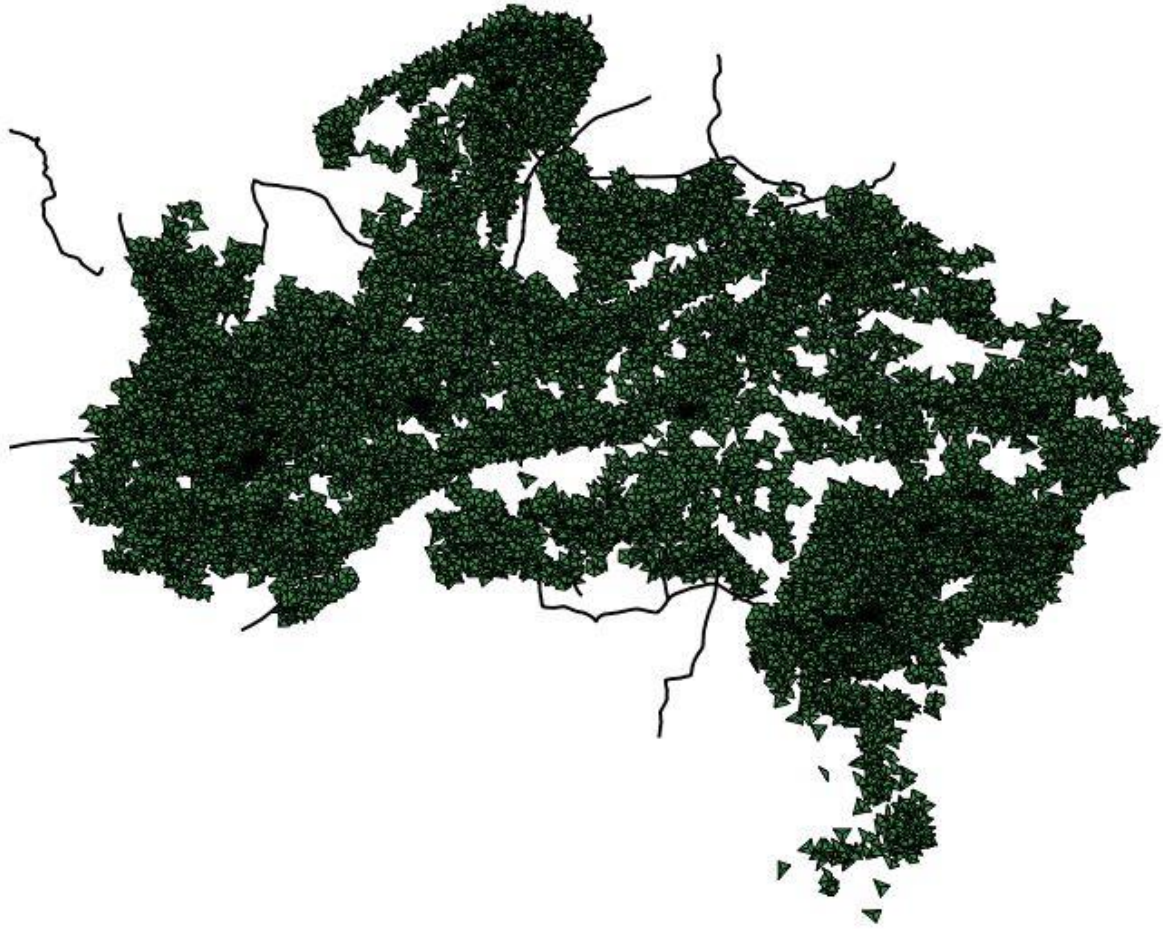
- Next, we open the **mobnet_processed_idea.csv** file through following steps



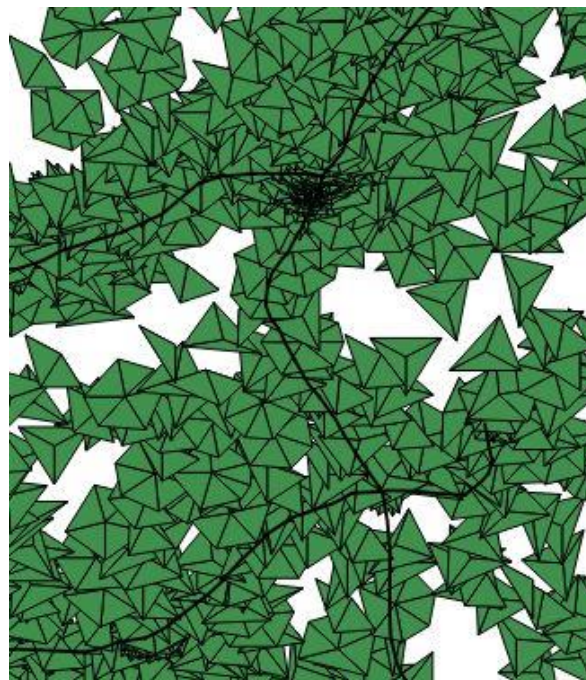
- Select the file (mobnet_processed_idea.csv) using 'Browse' and under 'Geometry definition' select 'Well Known Text (wkt)'. Click OK



- After clicking OK following output is seen



These are triangular coverage regions at various mobile tower locations for IDEA TSP. A zoomed version looks like this



- The next step is perform “Intersection” operation in QGIS using above imported layer and railway network layer.

This final step gives the railway network segments covered by each antenna. The attribute table of the intersected layer (attribute table is a database containing info on various parameter for each record in that layer) is exported as a csv file by name of “intersect_IDEA_MP.csv” for next step.

The csv file is shown below

CellID	SiteName	OGI1	Lat	Long	Azimuth	Zone	District	Sector_Rt_wkt	SectorN/Angle	lat1	lon1	lon2	lon2	Descripti	Railway_f	ELECTRIFI	DIVISION	ZONE	GAUGE	Shaps_Le_up	down	ID
752	BALAG9	BALAG9	404-78-30E	21.8194	80.1924	70	JABALPUR BALAGHA'	10 80.28883	2	95	21.8115	80.2888	21.8929	80.248	RAILWAY_NARROW_NO		NAGPUR	SOUTH EA	BROAD GA	20314.4	BALAGHA' HATTA RD.	136
753	BALAG9	BALAG9	404-78-33I	21.8194	80.1924	120	JABALPUR BALAGHA'	10 80.24791	3	145	21.7458	80.2479	21.8115	80.2888	RAILWAY_NARROW_NO		NAGPUR	SOUTH EA	BROAD GA	40854.6	BALAGHA' HATTA RD.	148
754	BALAG9	BALAG9	404-78-33I	21.8194	80.1924	120	JABALPUR BALAGHA'	10 80.24791	3	145	21.7458	80.2479	21.8115	80.2888	RAILWAY_NARROW_NO		NAGPUR	SOUTH EA	BROAD GA	20314.4	BALAGHA' HATTA RD.	136
755	BALAG9	BALAG9	404-78-30E	21.8194	80.1924	170	JABALPUR BALAGHA'	10 80.15156	4	205	21.7379	80.1516	21.7458	80.2479	RAILWAY_NARROW_NO		NAGPUR	SOUTH EA	BROAD GA	40854.6	BALAGHA' HATTA RD.	148
756	BALAG9	BALAG9	404-78-30E	21.8194	80.1924	170	JABALPUR BALAGHA'	10 80.15156	4	205	21.7379	80.1516	21.7458	80.2479	RAILWAY_NARROW_NO		NAGPUR	SOUTH EA	BROAD GA	20314.4	BALAGHA' HATTA RD.	136
757	BALAG9	BALAG9	404-78-33I	21.8194	80.1924	240	JABALPUR BALAGHA'	10 80.09898	5	255	21.7961	80.099	21.7379	80.1516	RAILWAY_NARROW_NO		NAGPUR	SOUTH EA	BROAD GA	40854.6	BALAGHA' HATTA RD.	148
758	KHND13A	KHND13	404-78-40I	21.8195	76.359	40	INDORE-2 EAST NIMJ	10 76.45575	1	90	21.8194	76.4558	21.9079	76.3422	RAILWAY_BROAD_GAI YES		BHOPAL	WEST GEN	BROAD GA	69273.7	KHANDW/ MATHELA	35
759	KHND13A	KHND13	404-78-40I	21.8195	76.359	40	INDORE-2 EAST NIMJ	10 76.45575	1	90	21.8194	76.4558	21.9079	76.3422	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
760	KHND13A	KHND13	404-78-40I	21.8195	76.359	40	INDORE-2 EAST NIMJ	10 76.45575	1	90	21.8194	76.4558	21.9079	76.3422	RAILWAY_METRE_GA NO		TIRUCHIRI	SOUTH CE	METRE GA	60714.9	KHANDW/ TAKAL	343
761	KHND13A	KHND13	404-78-40I	21.8195	76.359	40	INDORE-2 EAST NIMJ	10 76.45575	1	90	21.8194	76.4558	21.9079	76.3422	RAILWAY_BROAD_GAI YES		BHOPAL	WEST GEN	BROAD GA	69273.7	MATHELA TALWADY	226
762	KHND13A	KHND13	404-78-40I	21.8195	76.359	40	INDORE-2 EAST NIMJ	10 76.45575	1	90	21.8194	76.4558	21.9079	76.3422	RAILWAY_METRE_GA NO		RATLAM	NORTHERI	METRE GA	62376.6	AJANTI KHANDW/	117
763	KHND13Y	KHND13	404-78-33I	21.8195	76.359	140	INDORE-2 EAST NIMJ	10 76.39206	2	160	21.735	76.3921	21.8194	76.4558	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
764	KHND13Y	KHND13	404-78-33I	21.8195	76.359	140	INDORE-2 EAST NIMJ	10 76.39206	2	160	21.735	76.3921	21.8194	76.4558	RAILWAY_METRE_GA NO		TIRUCHIRI	SOUTH CE	METRE GA	60714.9	KHANDW/ TAKAL	343
765	KHND13B	KHND13	404-78-40I	21.8195	76.359	180	INDORE-2 EAST NIMJ	10 76.31063	3	210	21.7417	76.3106	21.735	76.3921	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
766	KHND13C	KHND13	404-78-40I	21.8195	76.359	300	INDORE-2 EAST NIMJ	10 76.34217	5	350	21.9079	76.3422	21.8194	76.2622	RAILWAY_METRE_GA NO		RATLAM	NORTHERI	METRE GA	62376.6	AJANTI KHANDW/	117
767	KHND11A	KHND11	404-78-40I	21.8202	76.349	10	INDORE-2 EAST NIMJ	10 76.40448	1	35	21.8938	76.4045	21.9016	76.308	RAILWAY_BROAD_GAI YES		BHOPAL	WEST GEN	BROAD GA	69273.7	KHANDW/ MATHELA	35
768	KHND11A	KHND11	404-78-40I	21.8202	76.349	10	INDORE-2 EAST NIMJ	10 76.40448	1	35	21.8938	76.4045	21.9016	76.308	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
769	KHND11A	KHND11	404-78-40I	21.8202	76.349	10	INDORE-2 EAST NIMJ	10 76.40448	1	35	21.8938	76.4045	21.9016	76.308	RAILWAY_METRE_GA NO		TIRUCHIRI	SOUTH CE	METRE GA	60714.9	KHANDW/ TAKAL	343
770	KHND11A	KHND11	404-78-40I	21.8202	76.349	10	INDORE-2 EAST NIMJ	10 76.40448	1	35	21.8938	76.4045	21.9016	76.308	RAILWAY_BROAD_GAI YES		BHOPAL	WEST GEN	BROAD GA	69273.7	MATHELA TALWADY	226
771	KHND11A	KHND11	404-78-40I	21.8202	76.349	10	INDORE-2 EAST NIMJ	10 76.40448	1	35	21.8938	76.4045	21.9016	76.308	RAILWAY_METRE_GA NO		RATLAM	NORTHERI	METRE GA	62376.6	AJANTI KHANDW/	117
772	KHND11X	KHND11	404-78-33I	21.8202	76.349	60	INDORE-2 EAST NIMJ	10 76.44571	2	90	21.8202	76.4457	21.8938	76.4045	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
773	KHND11X	KHND11	404-78-33I	21.8202	76.349	60	INDORE-2 EAST NIMJ	10 76.44571	2	90	21.8202	76.4457	21.8938	76.4045	RAILWAY_METRE_GA NO		TIRUCHIRI	SOUTH CE	METRE GA	60714.9	KHANDW/ TAKAL	343
774	KHND11B	KHND11	404-78-40I	21.8202	76.349	120	INDORE-2 EAST NIMJ	10 76.42304	3	130	21.7625	76.4231	21.8202	76.4457	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
775	KHND11B	KHND11	404-78-40I	21.8202	76.349	120	INDORE-2 EAST NIMJ	10 76.42304	3	130	21.7625	76.4231	21.8202	76.4457	RAILWAY_METRE_GA NO		TIRUCHIRI	SOUTH CE	METRE GA	60714.9	KHANDW/ TAKAL	343
776	KHND11Y	KHND11	404-78-33I	21.8202	76.349	140	INDORE-2 EAST NIMJ	10 76.39215	4	190	21.7318	76.3922	21.7625	76.4231	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
777	KHND11C	KHND11	404-78-40I	21.8202	76.349	300	INDORE-2 EAST NIMJ	10 76.30803	6	335	21.9016	76.308	21.8202	76.2522	RAILWAY_METRE_GA NO		RATLAM	NORTHERI	METRE GA	62376.6	AJANTI KHANDW/	117
778	DOWD11X	DOWD11	404-78-33I	21.8208	76.28	90	INDORE-2 KHANDW/	10 76.37347	1	105	21.7975	76.3735	21.8896	76.3423	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
779	DOWD11X	DOWD11	404-78-33I	21.8208	76.28	90	INDORE-2 KHANDW/	10 76.37347	1	105	21.7975	76.3735	21.8896	76.3423	RAILWAY_METRE_GA NO		RATLAM	NORTHERI	METRE GA	62376.6	AJANTI KHANDW/	117
780	DOWD11B	DOWD11	404-78-10C	21.8208	76.28	120	INDORE-2 EAST NIMJ	10 76.28002	2	180	21.731	76.28	21.7975	76.3735	RAILWAY_BROAD_GAI YES		BHUSAVAI	CENTRAL F	BROAD GA	66548.1	DONGARG KHANDW/	223
781	DOWD11Z	DOWD11	404-78-33I	21.8208	76.28	350	INDORE-2 KHANDW/	10 76.34224	5	400	21.8096	76.3423	21.8723	76.2007	RAILWAY_METRE_GA NO		RATLAM	NORTHERI	METRE GA	62376.6	AJANTI KHANDW/	117

ID shown in the table is railway segment number

UP and DOWN represent railway stations at two ends of railway segment

3) cdr_idea.py

This code reads the CDR data of the given individual (excel file 9644346975 idea.xlsx). It matches the Initial and Final Cell ID for each record in CDR with those in 'intersect_IDEA_MP.csv'.

Below shown is CDR data in form of excel file

9644346975 idea.xlsx - Excel

8	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
9	IMSI	404783311176687																	
10	From Date	31-07-2016	00:00:00	To Date	06-08-2016	10:55:07													
11	Calling (A) Part LRN	Called (B) Part	Date	Time	Duration	First Cell ID/LOCATION AREA CODE	Last Cell ID / PDP Address	Call Type	IMEI	IMSI	Type of Cc	SMS Centre Nu	First Roan	2G/3G/4G	Routing Area Code(RAC)				
12	9.19644E+11	N/A	VM-TEN	05-08-2016	16:07:46	0 40489-2054-46613	N/A	SMT	968627024695150	404783311176687	NA	9.1982E+11	Idea Ultra	2G	N/A				
13	9.19644E+11	N/A	VM-TEN	05-08-2016	16:07:41	0 40489-2054-46613	N/A	SMT	968627024695150	404783311176687	NA	9.1982E+11	Idea Ultra	2G	N/A				
14	9.19644E+11	N/A	VM-TEN	05-08-2016	16:07:35	0 40489-2054-46613	N/A	SMT	968627024695150	404783311176687	NA	9.1982E+11	Idea Ultra	2G	N/A				
15	9.19644E+11	N/A		5:30:20	05-08-2016	12:03:44	0 40478-38006-1241	N/A	SMT	968627024695150	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
16	9.19644E+11	N/A		9:11:40:1E+11	05-08-2016	11:57:07	7 40478-38006-1241	40478-38006-1241	MTC	968627024695150	404783311176687	NA	N/A	N/A	2G	N/A			
17	9.19644E+11	N/A		9:18:17:4E+11	05-08-2016	11:48:59	65 40478-38006-1241	40478-38006-1241	MTC	968627024695150	404783311176687	NA	N/A	N/A	2G	N/A			
18	9.19644E+11	N/A		IV-612345	05-08-2016	11:05:14	0 40478-38006-1241	N/A	SMT	968627024695150	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
19	9.19644E+11	N/A		9.19454E+11	05-08-2016	07:57:53	75 40478-33082-22313	40478-33082-22313	MOC	968627024695150	404783311176687	PP	N/A	N/A	3G	N/A			
20	9.19644E+11	N/A		9.19894E+11	05-08-2016	06:31:08	48 40478-32000-36111	40478-32000-36111	MTC	968627024695150	404783311176687	NA	N/A	N/A	2G	N/A			
21	9.19644E+11	N/A		3025	9.19203E+11	05-08-2016	06:30:11	9 40478-32000-36111	MOC	968627024695150	404783311176687	PP	N/A	N/A	2G	N/A			
22	9.19644E+11	N/A		3021	9.19451E+11	05-08-2016	05:00:06	23 40478-32000-37672	MOC	968627024695150	404783311176687	PP	N/A	N/A	2G	N/A			
23	9.19644E+11	N/A		3021	9.19451E+11	05-08-2016	05:53:52	7 40478-32000-37412	MOC	968627024695150	404783311176687	PP	N/A	N/A	2G	N/A			
24	9.19644E+11	N/A		3021	9.19451E+11	05-08-2016	05:53:28	1 40478-25008-13042	MOC	968627024695150	404783311176687	PP	N/A	N/A	2G	N/A			
25	9.19644E+11	N/A		9.19981E+11	04-08-2016	2:29:10	13 40478-38011-10033	40478-38011-10033	MTC	968627024695150	404783311176687	NA	N/A	N/A	2G	N/A			
26	9.19644E+11	N/A		VK-TENDAP	04-08-2016	20:42:28	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1983E+11	N/A	2G	N/A			
27	9.19644E+11	N/A		VK-TENDAP	04-08-2016	20:42:26	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1983E+11	N/A	2G	N/A			
28	9.19644E+11	N/A		VK-TENDAP	04-08-2016	20:42:23	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1983E+11	N/A	2G	N/A			
29	9.19644E+11	N/A		IV-612345	04-08-2016	19:03:23	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
30	9.19644E+11	N/A		IV-612345	04-08-2016	19:03:23	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
31	9.19644E+11	N/A		53111	04-08-2016	19:01:43	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
32	9.19644E+11	N/A		I2-IDEA	04-08-2016	18:56:07	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
33	9.19644E+11	N/A		Internet	04-08-2016	18:55:15	45 40478-38011-10033	100.85.23.31	GPD	968627024695160	404783311176687	PP	112.110.244.1	Idea Mad	2G	N/A			
34	9.19644E+11	N/A		IV-IDEA	04-08-2016	18:52:30	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
35	9.19644E+11	N/A		56789	04-08-2016	15:40:07	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
36	9.19644E+11	N/A		IV-IDEA	04-08-2016	14:53:04	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
37	9.19644E+11	N/A		53030	04-08-2016	14:09:22	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			
38	9.19644E+11	N/A		54300	04-08-2016	14:09:18	0 40478-38011-10033	N/A	SMT	968627024695160	404783311176687	NA	9.1982E+11	N/A	2G	N/A			

The final output is railway tracks and corresponding stations (for each matched Cell ID) at which the train running schedule is required on particular date and time (obtained from CDR data)

The final result is obtained in a csv file "result.csv". This can now be sent to Railway Authorities to get the railway operation data.

Below shown is the output file 'result.csv'

result_idea.csv - Excel

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Date	Time	ID	up	down	Zone	ZONE	Railway_B	Director	Descriptio	DIVISION					
2	05-08-2016	05:53:52	291	PABAI	GANJ	BHOPAL	WEST CENTRAL RAILWAY	VIDISHA		RAILWAY BROAD GAUGE DOUBLE LINE	BHOPAL					
3	05-08-2016	05:53:59	291	PABAI	GANJ	BAS BHOPAL	WEST CENTRAL RAILWAY	VIDISHA		RAILWAY BROAD GAUGE DOUBLE LINE	BHOPAL					
4	05-08-2016	11:05:14	446	MOHASO	DHAURRA	SAGAR	NORTH CENTRAL RAILWAY	SAGAR		RAILWAY BROAD GAUGE DOUBLE LINE						
5	05-08-2016	11:48:59	446	MOHASO	DHAURRA	SAGAR	NORTH CENTRAL RAILWAY	SAGAR		RAILWAY BROAD GAUGE DOUBLE LINE						
6	05-08-2016	11:50:04	446	MOHASO	DHAURRA	SAGAR	NORTH CENTRAL RAILWAY	SAGAR		RAILWAY BROAD GAUGE DOUBLE LINE						
7	05-08-2016	11:57:07	446	MOHASO	DHAURRA	SAGAR	NORTH CENTRAL RAILWAY	SAGAR		RAILWAY BROAD GAUGE DOUBLE LINE						
8	05-08-2016	11:57:14	446	MOHASO	DHAURRA	SAGAR	NORTH CENTRAL RAILWAY	SAGAR		RAILWAY BROAD GAUGE DOUBLE LINE						
9	05-08-2016	12:03:44	446	MOHASO	DHAURRA	SAGAR	NORTH CENTRAL RAILWAY	SAGAR		RAILWAY BROAD GAUGE DOUBLE LINE						