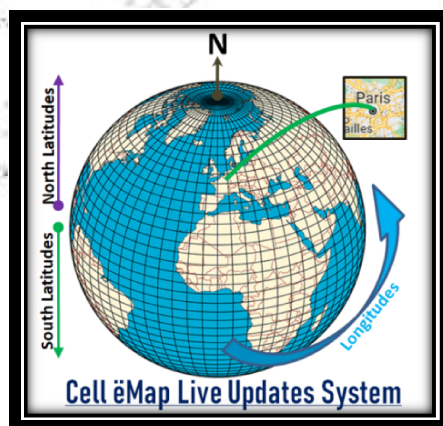


# Cell eMap Live Updates System

Henry V. Pham

The **Cell eMap Live Updates System** is the new map layout in cells, based on Latitudes and Longitudes in  $10^\circ$ ,  $1^\circ$  and down to  $1\text{km}^2$  cell maps. The Latitudes and Longitudes (LAT) in  $10^\circ$  Cell eMap is used for spaces, high speed flying objects or earth scanning. The Latitudes and Longitudes (LAT) in  $1^\circ$  Cell eMap is used for faster map scanning and pin point a location on earth easier and faster. The highest resolution of Cell eMap is the  $1\text{km}^2$  cell and is used for mapping and navigation system in city or crowded area. The **Cell eMap Live Updates System** is designed with State-of-The-Art and support local organization offices update and maintain the Cell eMaps easier and secured than ever with broadcasting cell e-maps. Figure-1 below shows the Globe Latitudes and Longitudes in  $10^\circ$  layout for a quick view of the globe.



**Figure-1: Globe Latitudes and Longitudes Layout**

The **Cell eMap Live Updates System** is designed to allow local organizations around the world able to update their points of interest, and live traffic notifications; the local organizations know their local points of interest better. This system can be used with the existing **Cell Phone Towers** or new form of **Broadcasting Towers** to broadcast Cell eMaps around each tower. When cars or smart devices travel close to a tower, the cars or smart devices will receive the next Cell eMaps and use in Navigation Systems and ready for the next moves along their way. This invention will help satellites, space stations, airplanes and cars with smart devices travel and locate positions on earth easier and faster and ready for our future spaces pin point on earth more accurate from far distances when we have with the **Cell eMap Towers** located on earth. Cell eMap Towers can be covered  $10^\circ$  (6,480 towers max) or  $1^\circ$  layout (64,800 towers max) layout at each map's corners where are possible on land or ocean.

# Cell eMap Live Updates System

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## Latitudes and Longitudes 10° Layout

The Equator and the Prime Meridian are the main lines defined the position zero on earth to start with. We have total of 36 meridians of Longitude and 9 North Latitudes and 9 South Latitudes with 10° layout. Figure-2 below shows the Globe in 10° Latitudes and Longitudes layout which can be found on Wiki Encyclopedia.

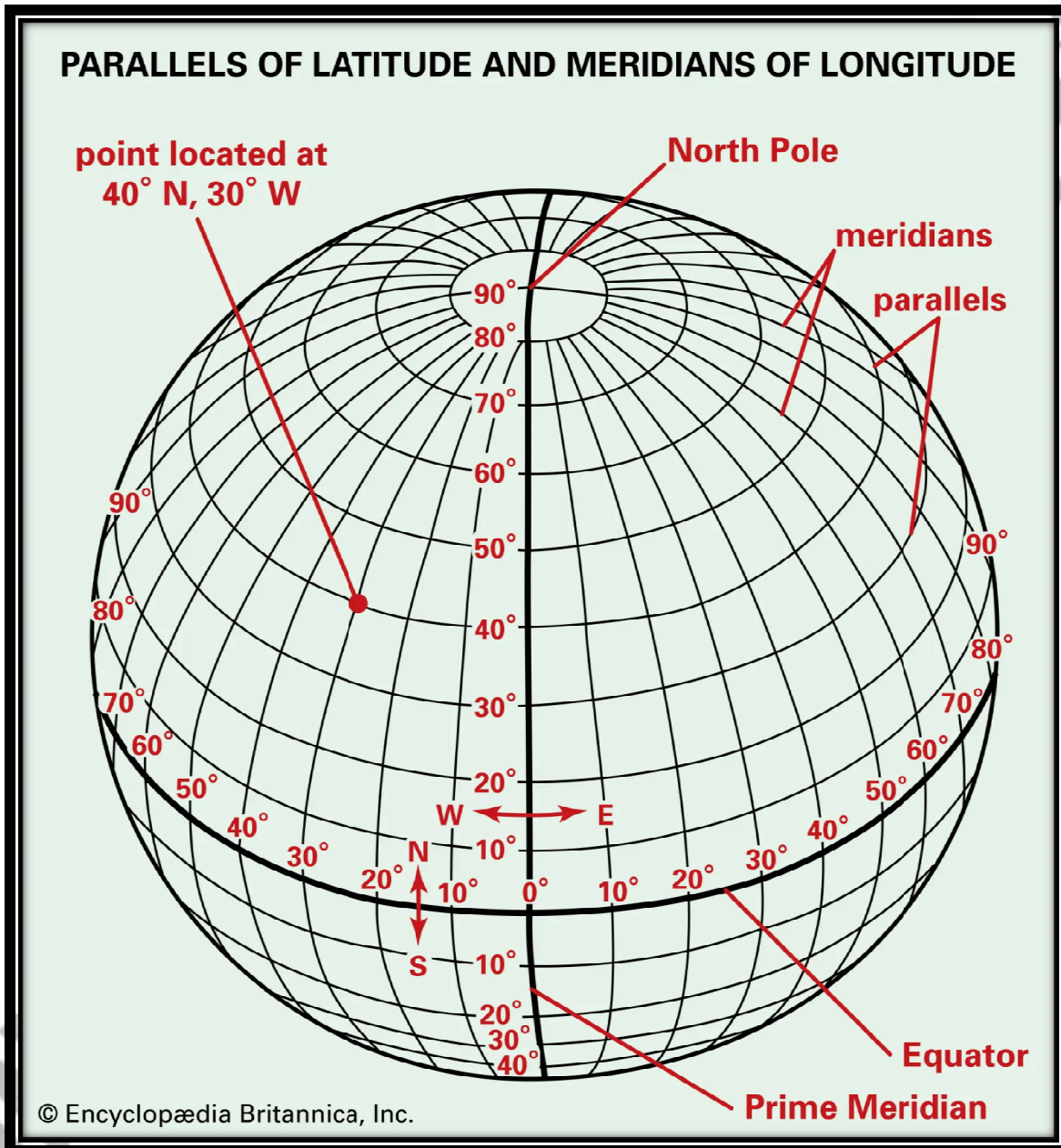


Figure-2: Globe Latitudes and Longitudes 10° Layout

# Cell eMap Live Updates System

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## Latitudes Radius and High Calculations

The **Cell eMap Live Updates System** is designed with the  $1\text{km}^2$  cell for highest resolution of Cell eMap, and each cell position can be calculated based on the radius and the high of each Latitude that the cell map is occupied. This section will provide the calculations for each Cell eMap locate on Latitudes in radius, circumference, area and the arc of each cell. Figure-3 below shows the radius and high calculations based on the given Equator dimension of 40,075.017 km.

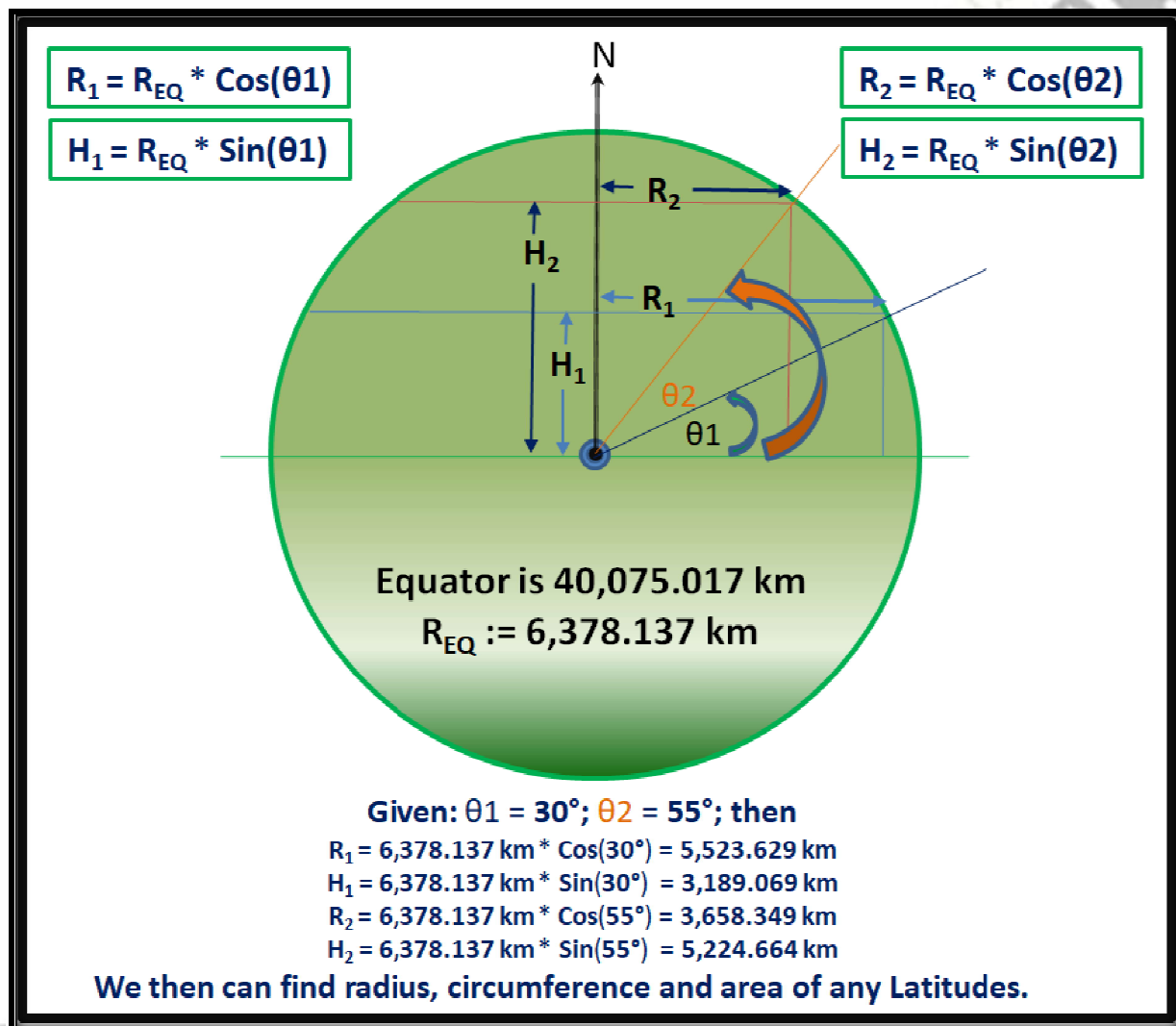


Figure-3: Latitudes' Radius and High Calculations Formulas

# Cell eMap Live Updates System

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## LAT (Latitudes) Cell eMap Calculations

We can calculate the radius of the Equator, radius and high of Latitudes in 10° layout in Figure-4 below; also the area of Latitude cells in 10° layout can be calculated based on the Equator length, and the distance between 10° each Latitude. Figure-4 shows the calculation of ring area of Latitudes 0° to 10° (LAT10) equals 44,385,159.549 km<sup>2</sup>; so each 10° Latitude cell (LAT10 Cell) area equals 44,385,159.549 km<sup>2</sup>/36 = 1,232,921.099 km<sup>2</sup>. With this calculation, we can calculate any LAT10 cell area as shown in Figure-4 below.

**Based on Wiki, the Equator is 40,075.017 km; so the radius  $R_{EQ} := 6,378.137$  km**

Then we can have Radius of 10° Latitudes formula:  $R_{\theta Lat} := \text{Cos}(\theta) * R_{EQ}$

$$R_{10^\circ Lat} = \text{Cos}(10^\circ) * 6,378.137 \text{ km} = 6,281.239 \text{ km}$$

$$R_{50^\circ Lat} = \text{Cos}(50^\circ) * 6,378.137 \text{ km} = 4,099.787 \text{ km}$$

$$R_{90^\circ Lat} = \text{Cos}(90^\circ) * 6,378.137 \text{ km} = 0.0 \text{ km}$$

...

$$H_{10^\circ Lat} = \text{Sin}(10^\circ) * 6,378.137 \text{ km} = 1,107.552 \text{ km}$$

$$H_{50^\circ Lat} = \text{Sin}(50^\circ) * 6,378.137 \text{ km} = 4,885.936 \text{ km}$$

$$H_{90^\circ Lat} = \text{Sin}(90^\circ) * 6,378.137 \text{ km} = 6,378.137 \text{ km}$$

...

$$C_{10^\circ Lat} = \pi * 2 * 6,281.239 \text{ km} = 39,466.187 \text{ km}$$

$$C_{50^\circ Lat} = \pi * 2 * 4,099.787 \text{ km} = 25,759.724 \text{ km}$$

$$C_{90^\circ Lat} = \pi * 2 * 0.0 \text{ km} = 0.0 \text{ km}$$

...

$$\text{Arc}_{10^\circ Lat} = 39,466.187 \text{ km} / 36 = 1,096.283 \text{ km}$$

$$\text{Arc}_{50^\circ Lat} = 25,759.724 \text{ km} / 36 = 715.548 \text{ km}$$

$$\text{Arc}_{90^\circ Lat} = 0.0 \text{ km} / 36 = 0.0 \text{ km}$$

...

**We have average distance of each 10° Latitude is 1,113.195 km.**

**We can calculate Area of all LAT Ring Area and LAT 10° Cell Area as below:**

**NOTE: There are (18\*36) = 648 LAT 10° Cells; and (180\*360) = 64,800 LAT 1° Cells.**

$$\text{All LAT-CellMap}_{10^\circ Lat} = \pi * 2 * R_{EQ} * (H_{10^\circ Lat} - H_{0^\circ Lat}) = 44,385,159.549 \text{ km}^2$$

$$\text{LATCellMap}_{10^\circ Lat} = (44,385,159.549 \text{ km}^2) / 36 = 1,232,921.099 \text{ km}^2$$

$$\text{ALL LAT-CellMap}_{50^\circ Lat} = \pi * 2 * R_{EQ} * (H_{50^\circ Lat} - H_{40^\circ Lat}) = 31,504,933.083 \text{ km}^2$$

$$\text{LATCellMap}_{50^\circ Lat} = (31,504,933.083 \text{ km}^2) / 36 = 875,137.030 \text{ km}^2$$

$$\text{ALL LAT-CellMap}_{90^\circ Lat} = \pi * 2 * R_{EQ} * (H_{90^\circ Lat} - H_{80^\circ Lat}) = 3,883,198.289 \text{ km}^2$$

$$\text{LATCellMap}_{90^\circ Lat} = (3,883,198.289 \text{ km}^2) / 36 = 107,866.619 \text{ km}^2$$

...

**Figure-4: Latitudes' Cell eMap in 10° Layout Calculations**

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## LAT (Latitudes) 10° Cell eMap Format

The new format of point on map will be in Latitude and Meridian degrees. LAT stands for Latitude and following with degree 0°-90°, M stands for Meridian and following with meridian number (n) from 1-360; meridian 0 is the starting point. For instance, **Washington DC** with current method located at **38° North & 77° West**; so it is located at LAT-Cell map **LAT40N-M290** or with higher resolution or pinpoint location more closer could be written as cell map **LAT38N-M283**. Figure-5 shows the Latitudes Cell eMaps format for 10° layout.

### 10° LAT-Cell eMap

**10° Latitude Longitude Cell eMap use for earth scanning or high altitude mapping methods.**

**LAT<dd>N/S:** North/South Latitude at each 10° degree; where dd:={00, 10..90}.

**Mn:** Meridian n; where meridian n:={1..36}; starts from M1 – M36

We can refer:

Cell-Map **LAT10N-M10** as a cell map at LAT10N within 0°-10° north of **Prime Meridian (Meridian-1) & Equator**;

**LAT20N-M10** as a cell map at LAT20N within 10°-20° north of **LAT10 & Meridian-10**;

**LAT50N-M330** as a cell map at LAT50N within 40°-50° north of **LAT50 & Meridian-33**.

For instance, **Washington DC** with current method located at **38° North & 77° West**;  
so it is located at LAT-Cell map **LAT40N-M29** or with higher resolution or pinpoint location could be written as cell map **LAT38N-M283**.

Figure-5: Latitudes' Cell eMap 10° Format

With the new format showing above, we have the Table-1 below shows LAT Cell eMap in 10° layout with details of Latitudes' high, Latitudes' radius, Latitudes' circumference, Latitudes' arc length, LAT Cell eMaps' area. Start from the Equator, **LAT00E-M0** stands for Latitude at 0° (Equator) and Meridian 0 at 0° showing in yellow highlight. **LAT10N-Mn** stands for Latitude at 10° north and Meridian n; where n can be a meridian number from 1 – 360. Note that for this Cell eMap in 10° format, this table shows n from 10 – 360. We can see the south LAT Cell eMaps are showing the same number in length as the north and LAT Cell eMaps are labeled as **LATddS-Mn**.

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LAT Cell Map 10° Label	LAT Deg	LAT High (km)	LAT Rad (km)	LAT CIR (km)	LAT 10° Arc (km)	LAT Cell Map 10° Area (km <sup>2</sup> )	LAT 10° Area (km <sup>2</sup> )
LAT90N-Mn	90	6,378.137	0.000	0.000	0.000	0.000	0.000
LAT80N-Mn	80	6,281.239	1,107.552	6,958.954	193.304	107,866.619	3,883,198.289
LAT70N-Mn	70	5,993.488	2,181.451	13,706.463	380.735	320,322.385	11,531,605.853
LAT60N-Mn	60	5,523.629	3,189.069	20,037.508	556.597	523,045.317	18,829,631.408
LAT50N-Mn	50	4,885.936	4,099.787	25,759.724	715.548	709,875.782	25,555,528.141
LAT40N-Mn	40	4,099.787	4,885.936	30,699.244	852.757	875,137.030	31,504,933.083
LAT30N-Mn	30	3,189.069	5,523.629	34,705.983	964.055	1,013,807.683	36,497,076.575
LAT20N-Mn	20	2,181.451	5,993.488	37,658.197	1,046.061	1,121,674.302	40,380,274.865
LAT10N-Mn	10	1,107.552	6,281.239	39,466.187	1,096.283	1,195,459.415	43,036,538.936
LAT00E-Mn	0	0.000	6,378.137	40,075.017	1,113.195	1,232,921.099	44,385,159.549
LAT10S-Mn	10	1,107.552	6,281.239	39,466.187	1,096.283	1,232,921.099	44,385,159.549
LAT20S-Mn	20	2,181.451	5,993.488	37,658.197	1,046.061	1,195,459.415	43,036,538.936
LAT30S-Mn	30	3,189.069	5,523.629	34,705.983	964.055	1,121,674.302	40,380,274.865
LAT40S-Mn	40	4,099.787	4,885.936	30,699.244	852.757	1,013,807.683	36,497,076.575
LAT50S-Mn	50	4,885.936	4,099.787	25,759.724	715.548	875,137.030	31,504,933.083
LAT60S-Mn	60	5,523.629	3,189.069	20,037.508	556.597	709,875.782	25,555,528.141
LAT70S-Mn	70	5,993.488	2,181.451	13,706.463	380.735	523,045.317	18,829,631.408
LAT80S-Mn	80	6,281.239	1,107.552	6,958.954	193.304	320,322.385	11,531,605.853
LAT90S-Mn	90	6,378.137	0.000	0.000	0.000	107,866.619	3,883,198.289

Table-1: Latitudes' Cell eMap 10° Information Table

## LAT (Latitudes) 1° Cell eMap Format

The new format of 1° Latitude and Meridian is the same as 10° layout above, except that the cell is divided into 1° Latitude and Meridian shown in Figure-6 below.

### 1° LAT-Cell eMap

1° Latitude Longitude Cell eMap use for higher mapping methods, and could be extended up to 9 fractional digits of degree.

**LAT<dd>N/S:** North/South Latitude at each 1° degree; where dd={00, 01..90}.

**Mn:** Meridian n; where meridian n={0, 1..360}; starts from M1 – M360 and be trick as meridian degree from 0 to 360 degrees for one complete circle;

**However, for more mapping resolution, we can use fractional degree up to 9 digits.**

The format would be **LAT12.135246579N-M125.246135864;**  
 this would be in current format at **LAT 12° 8' 6.9" N 125° 14' 46.1"**

Figure-6: Latitudes' Cell eMap 1° Format

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LAT Cell Map 1° Label	LAT 1° Deg	LAT High (km)	LAT Rad (km)	LAT CIR (km)	LAT 1° Arc (km)	LAT Cell Map 1° Area (km <sup>2</sup> )	LAT 1° Area (km <sup>2</sup> )
LAT90N-Mn	90	6,378.137	0.000	0.000	0.000	0.000	0.000
LAT89N-Mn	89	6,377.166	111.314	699.405	1.943	108.138	38,929.719
LAT88N-Mn	88	6,374.252	222.594	1,398.598	3.885	324.381	116,777.299
LAT87N-Mn	87	6,369.396	333.806	2,097.364	5.826	540.526	194,589.307
LAT86N-Mn	86	6,362.600	444.916	2,795.492	7.765	756.506	272,342.042
LAT85N-Mn	85	6,353.866	555.891	3,492.768	9.702	972.255	350,011.819
LAT84N-Mn	84	6,343.197	666.697	4,188.980	11.636	1,187.708	427,574.978
LAT83N-Mn	83	6,330.595	777.299	4,883.916	13.566	1,402.800	505,007.894
LAT82N-Mn	82	6,316.065	887.665	5,577.364	15.493	1,617.464	582,286.980
LAT81N-Mn	81	6,299.612	997.760	6,269.114	17.414	1,831.635	659,388.696
LAT80N-Mn	80	6,281.239	1,107.552	6,958.954	19.330	2,045.249	736,289.555
LAT79N-Mn	79	6,260.953	1,217.006	7,646.674	21.241	2,258.239	812,966.133
LAT78N-Mn	78	6,238.759	1,326.089	8,332.064	23.145	2,470.542	889,395.075
LAT77N-Mn	77	6,214.666	1,434.769	9,014.917	25.041	2,682.092	965,553.097
LAT76N-Mn	76	6,188.679	1,543.011	9,695.024	26.931	2,892.825	1,041,417.003
LAT75N-Mn	75	6,160.807	1,650.783	10,372.178	28.812	3,102.677	1,116,963.683
LAT74N-Mn	74	6,131.059	1,758.053	11,046.172	30.684	3,311.584	1,192,170.126
LAT73N-Mn	73	6,099.443	1,864.787	11,716.801	32.547	3,519.482	1,267,013.421
LAT72N-Mn	72	6,065.969	1,970.953	12,383.861	34.400	3,726.308	1,341,470.772
LAT71N-Mn	71	6,030.647	2,076.518	13,047.149	36.242	3,931.999	1,415,519.498
LAT70N-Mn	70	5,993.488	2,181.451	13,706.463	38.074	4,136.492	1,489,137.044
LAT69N-Mn	69	5,954.504	2,285.720	14,361.602	39.893	4,339.725	1,562,300.983
LAT68N-Mn	68	5,913.706	2,389.292	15,012.365	41.701	4,541.636	1,634,989.031
LAT67N-Mn	67	5,871.106	2,492.137	15,658.556	43.496	4,742.164	1,707,179.045
LAT66N-Mn	66	5,826.718	2,594.222	16,299.978	45.278	4,941.247	1,778,849.036
LAT65N-Mn	65	5,780.555	2,695.517	16,936.434	47.046	5,138.825	1,849,977.172
LAT64N-Mn	64	5,732.632	2,795.991	17,567.731	48.799	5,334.838	1,920,541.787
LAT63N-Mn	63	5,682.962	2,895.614	18,193.677	50.538	5,529.226	1,990,521.387
LAT62N-Mn	62	5,631.561	2,994.354	18,814.081	52.261	5,721.930	2,059,894.654
LAT61N-Mn	61	5,578.444	3,092.182	19,428.754	53.969	5,912.890	2,128,640.458
LAT60N-Mn	60	5,523.629	3,189.069	20,037.508	55.660	6,102.050	2,196,737.857
LAT59N-Mn	59	5,467.130	3,284.983	20,640.159	57.334	6,289.350	2,264,166.108
LAT58N-Mn	58	5,408.967	3,379.898	21,236.523	58.990	6,474.735	2,330,904.673
LAT57N-Mn	57	5,349.156	3,473.782	21,826.418	60.629	6,658.148	2,396,933.221
LAT56N-Mn	56	5,287.715	3,566.609	22,409.665	62.249	6,839.532	2,462,231.640
LAT55N-Mn	55	5,224.664	3,658.349	22,986.085	63.850	7,018.833	2,526,780.040
LAT54N-Mn	54	5,160.021	3,748.975	23,555.504	65.432	7,195.997	2,590,558.758
LAT53N-Mn	53	5,093.807	3,838.459	24,117.747	66.994	7,370.968	2,653,548.367
LAT52N-Mn	52	5,026.041	3,926.773	24,672.644	68.535	7,543.694	2,715,729.679
LAT51N-Mn	51	4,956.743	4,013.892	25,220.025	70.056	7,714.122	2,777,083.754
LAT50N-Mn	50	4,885.936	4,099.787	25,759.724	71.555	7,882.200	2,837,591.902
LAT49N-Mn	49	4,813.641	4,184.434	26,291.577	73.032	8,047.877	2,897,235.692
LAT48N-Mn	48	4,739.880	4,267.807	26,815.420	74.487	8,211.103	2,955,996.956
LAT47N-Mn	47	4,664.674	4,349.879	27,331.096	75.920	8,371.827	3,013,857.794
LAT46N-Mn	46	4,588.048	4,430.626	27,838.446	77.329	8,530.002	3,070,800.583

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LAT45N-Mn	45	4,510.024	4,510.024	28,337.316	78.715	8,685.578	3,126,807.975
LAT44N-Mn	44	4,430.626	4,588.048	28,827.555	80.077	8,838.508	3,181,862.912
LAT43N-Mn	43	4,349.879	4,664.674	29,309.012	81.414	8,988.746	3,235,948.623
LAT42N-Mn	42	4,267.807	4,739.880	29,781.541	82.727	9,136.246	3,289,048.632
LAT41N-Mn	41	4,184.434	4,813.641	30,244.999	84.014	9,280.963	3,341,146.765
LAT40N-Mn	40	4,099.787	4,885.936	30,699.244	85.276	9,422.853	3,392,227.152
LAT39N-Mn	39	4,013.892	4,956.743	31,144.137	86.511	9,561.873	3,442,274.235
LAT38N-Mn	38	3,926.773	5,026.041	31,579.544	87.721	9,697.980	3,491,272.767
LAT37N-Mn	37	3,838.459	5,093.807	32,005.331	88.904	9,831.133	3,539,207.823
LAT36N-Mn	36	3,748.975	5,160.021	32,421.370	90.059	9,961.291	3,586,064.803
LAT35N-Mn	35	3,658.349	5,224.664	32,827.532	91.188	10,088.415	3,631,829.433
LAT34N-Mn	34	3,566.609	5,287.715	33,223.695	92.288	10,212.466	3,676,487.772
LAT33N-Mn	33	3,473.782	5,349.156	33,609.737	93.360	10,333.406	3,720,026.217
LAT32N-Mn	32	3,379.898	5,408.967	33,985.542	94.404	10,451.199	3,762,431.506
LAT31N-Mn	31	3,284.983	5,467.130	34,350.994	95.419	10,565.808	3,803,690.723
LAT30N-Mn	30	3,189.069	5,523.629	34,705.983	96.406	10,677.198	3,843,791.298
LAT29N-Mn	29	3,092.182	5,578.444	35,050.399	97.362	10,785.336	3,882,721.017
LAT28N-Mn	28	2,994.354	5,631.561	35,384.140	98.289	10,890.189	3,920,468.022
LAT27N-Mn	27	2,895.614	5,682.962	35,707.101	99.186	10,991.724	3,957,020.814
LAT26N-Mn	26	2,795.991	5,732.632	36,019.186	100.053	11,089.912	3,992,368.259
LAT25N-Mn	25	2,695.517	5,780.555	36,320.300	100.890	11,184.721	4,026,499.590
LAT24N-Mn	24	2,594.222	5,826.718	36,610.349	101.695	11,276.123	4,059,404.411
LAT23N-Mn	23	2,492.137	5,871.106	36,889.247	102.470	11,364.091	4,091,072.697
LAT22N-Mn	22	2,389.292	5,913.706	37,156.908	103.214	11,448.597	4,121,494.803
LAT21N-Mn	21	2,285.720	5,954.504	37,413.251	103.926	11,529.615	4,150,661.462
LAT20N-Mn	20	2,181.451	5,993.488	37,658.197	104.606	11,607.122	4,178,563.790
LAT19N-Mn	19	2,076.518	6,030.647	37,891.673	105.255	11,681.092	4,205,193.286
LAT18N-Mn	18	1,970.953	6,065.969	38,113.606	105.871	11,751.505	4,230,541.839
LAT17N-Mn	17	1,864.787	6,099.443	38,323.929	106.455	11,818.338	4,254,601.729
LAT16N-Mn	16	1,758.053	6,131.059	38,522.579	107.007	11,881.571	4,277,365.626
LAT15N-Mn	15	1,650.783	6,160.807	38,709.494	107.526	11,941.185	4,298,826.595
LAT14N-Mn	14	1,543.011	6,188.679	38,884.617	108.013	11,997.161	4,318,978.101
LAT13N-Mn	13	1,434.769	6,214.666	39,047.897	108.466	12,049.483	4,337,814.004
LAT12N-Mn	12	1,326.089	6,238.759	39,199.281	108.887	12,098.135	4,355,328.566
LAT11N-Mn	11	1,217.006	6,260.953	39,338.726	109.274	12,143.101	4,371,516.454
LAT10N-Mn	10	1,107.552	6,281.239	39,466.187	109.628	12,184.369	4,386,372.735
LAT09N-Mn	9	997.760	6,299.612	39,581.627	109.949	12,221.925	4,399,892.885
LAT08N-Mn	8	887.665	6,316.065	39,685.009	110.236	12,255.758	4,412,072.784
LAT07N-Mn	7	777.299	6,330.595	39,776.304	110.490	12,285.858	4,422,908.724
LAT06N-Mn	6	666.697	6,343.197	39,855.482	110.710	12,312.215	4,432,397.402
LAT05N-Mn	5	555.891	6,353.866	39,922.519	110.896	12,334.822	4,440,535.930
LAT04N-Mn	4	444.916	6,362.600	39,977.396	111.048	12,353.672	4,447,321.827
LAT03N-Mn	3	333.806	6,369.396	40,020.095	111.167	12,368.758	4,452,753.027
LAT02N-Mn	2	222.594	6,374.252	40,050.604	111.252	12,380.077	4,456,827.875
LAT01N-Mn	1	111.314	6,377.166	40,068.913	111.303	12,387.625	4,459,545.130
LAT00E-Mn	0	0.000	6,378.137	40,075.017	111.319	12,391.400	4,460,903.965

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LAT00E-Mn	0	0.000	6,378.137	40,075.017	111.319	12,391.400	4,460,903.965
LAT01S-Mn	1	111.314	6,377.166	40,068.913	111.303	12,391.400	4,460,903.965
LAT02S-Mn	2	222.594	6,374.252	40,050.604	111.252	12,387.625	4,459,545.130
LAT03S-Mn	3	333.806	6,369.396	40,020.095	111.167	12,380.077	4,456,827.875
LAT04S-Mn	4	444.916	6,362.600	39,977.396	111.048	12,368.758	4,452,753.027
LAT05S-Mn	5	555.891	6,353.866	39,922.519	110.896	12,353.672	4,447,321.827
LAT06S-Mn	6	666.697	6,343.197	39,855.482	110.710	12,334.822	4,440,535.930
LAT07S-Mn	7	777.299	6,330.595	39,776.304	110.490	12,312.215	4,432,397.402
LAT08S-Mn	8	887.665	6,316.065	39,685.009	110.236	12,285.858	4,422,908.724
LAT09S-Mn	9	997.760	6,299.612	39,581.627	109.949	12,255.758	4,412,072.784
LAT10S-Mn	10	1,107.552	6,281.239	39,466.187	109.628	12,221.925	4,399,892.885
LAT11S-Mn	11	1,217.006	6,260.953	39,338.726	109.274	12,184.369	4,386,372.735
LAT12S-Mn	12	1,326.089	6,238.759	39,199.281	108.887	12,143.101	4,371,516.454
LAT13S-Mn	13	1,434.769	6,214.666	39,047.897	108.466	12,098.135	4,355,328.566
LAT14S-Mn	14	1,543.011	6,188.679	38,884.617	108.013	12,049.483	4,337,814.004
LAT15S-Mn	15	1,650.783	6,160.807	38,709.494	107.526	11,997.161	4,318,978.101
LAT16S-Mn	16	1,758.053	6,131.059	38,522.579	107.007	11,941.185	4,298,826.595
LAT17S-Mn	17	1,864.787	6,099.443	38,323.929	106.455	11,881.571	4,277,365.626
LAT18S-Mn	18	1,970.953	6,065.969	38,113.606	105.871	11,818.338	4,254,601.729
LAT19S-Mn	19	2,076.518	6,030.647	37,891.673	105.255	11,751.505	4,230,541.839
LAT20S-Mn	20	2,181.451	5,993.488	37,658.197	104.606	11,681.092	4,205,193.286
LAT21S-Mn	21	2,285.720	5,954.504	37,413.251	103.926	11,607.122	4,178,563.790
LAT22S-Mn	22	2,389.292	5,913.706	37,156.908	103.214	11,529.615	4,150,661.462
LAT23S-Mn	23	2,492.137	5,871.106	36,889.247	102.470	11,448.597	4,121,494.803
LAT24S-Mn	24	2,594.222	5,826.718	36,610.349	101.695	11,364.091	4,091,072.697
LAT25S-Mn	25	2,695.517	5,780.555	36,320.300	100.890	11,276.123	4,059,404.411
LAT26S-Mn	26	2,795.991	5,732.632	36,019.186	100.053	11,184.721	4,026,499.590
LAT27S-Mn	27	2,895.614	5,682.962	35,707.101	99.186	11,089.912	3,992,368.259
LAT28S-Mn	28	2,994.354	5,631.561	35,384.140	98.289	10,991.724	3,957,020.814
LAT29S-Mn	29	3,092.182	5,578.444	35,050.399	97.362	10,890.189	3,920,468.022
LAT30S-Mn	30	3,189.069	5,523.629	34,705.983	96.406	10,785.336	3,882,721.017
LAT31S-Mn	31	3,284.983	5,467.130	34,350.994	95.419	10,677.198	3,843,791.298
LAT32S-Mn	32	3,379.898	5,408.967	33,985.542	94.404	10,565.808	3,803,690.723
LAT33S-Mn	33	3,473.782	5,349.156	33,609.737	93.360	10,451.199	3,762,431.506
LAT34S-Mn	34	3,566.609	5,287.715	33,223.695	92.288	10,333.406	3,720,026.217
LAT35S-Mn	35	3,658.349	5,224.664	32,827.532	91.188	10,212.466	3,676,487.772
LAT36S-Mn	36	3,748.975	5,160.021	32,421.370	90.059	10,088.415	3,631,829.433
LAT37S-Mn	37	3,838.459	5,093.807	32,005.331	88.904	9,961.291	3,586,064.803
LAT38S-Mn	38	3,926.773	5,026.041	31,579.544	87.721	9,831.133	3,539,207.823
LAT39S-Mn	39	4,013.892	4,956.743	31,144.137	86.511	9,697.980	3,491,272.767
LAT40S-Mn	40	4,099.787	4,885.936	30,699.244	85.276	9,561.873	3,442,274.235
LAT41S-Mn	41	4,184.434	4,813.641	30,244.999	84.014	9,422.853	3,392,227.152
LAT42S-Mn	42	4,267.807	4,739.880	29,781.541	82.727	9,280.963	3,341,146.765
LAT43S-Mn	43	4,349.879	4,664.674	29,309.012	81.414	9,136.246	3,289,048.632
LAT44S-Mn	44	4,430.626	4,588.048	28,827.555	80.077	8,988.746	3,235,948.623
LAT45S-Mn	45	4,510.024	4,510.024	28,337.316	78.715	8,838.508	3,181,862.912

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LAT46S-Mn	46	4,588.048	4,430.626	27,838.446	77.329	8,685.578	3,126,807.975
LAT47S-Mn	47	4,664.674	4,349.879	27,331.096	75.920	8,530.002	3,070,800.583
LAT48S-Mn	48	4,739.880	4,267.807	26,815.420	74.487	8,371.827	3,013,857.794
LAT49S-Mn	49	4,813.641	4,184.434	26,291.577	73.032	8,211.103	2,955,996.956
LAT50S-Mn	50	4,885.936	4,099.787	25,759.724	71.555	8,047.877	2,897,235.692
LAT51S-Mn	51	4,956.743	4,013.892	25,220.025	70.056	7,882.200	2,837,591.902
LAT52S-Mn	52	5,026.041	3,926.773	24,672.644	68.535	7,714.122	2,777,083.754
LAT53S-Mn	53	5,093.807	3,838.459	24,117.747	66.994	7,543.694	2,715,729.679
LAT54S-Mn	54	5,160.021	3,748.975	23,555.504	65.432	7,370.968	2,653,548.367
LAT55S-Mn	55	5,224.664	3,658.349	22,986.085	63.850	7,195.997	2,590,558.758
LAT56S-Mn	56	5,287.715	3,566.609	22,409.665	62.249	7,018.833	2,526,780.040
LAT57S-Mn	57	5,349.156	3,473.782	21,826.418	60.629	6,839.532	2,462,231.640
LAT58S-Mn	58	5,408.967	3,379.898	21,236.523	58.990	6,658.148	2,396,933.221
LAT59S-Mn	59	5,467.130	3,284.983	20,640.159	57.334	6,474.735	2,330,904.673
LAT60S-Mn	60	5,523.629	3,189.069	20,037.508	55.660	6,289.350	2,264,166.108
LAT61S-Mn	61	5,578.444	3,092.182	19,428.754	53.969	6,102.050	2,196,737.857
LAT62S-Mn	62	5,631.561	2,994.354	18,814.081	52.261	5,912.890	2,128,640.458
LAT63S-Mn	63	5,682.962	2,895.614	18,193.677	50.538	5,721.930	2,059,894.654
LAT64S-Mn	64	5,732.632	2,795.991	17,567.731	48.799	5,529.226	1,990,521.387
LAT65S-Mn	65	5,780.555	2,695.517	16,936.434	47.046	5,334.838	1,920,541.787
LAT66S-Mn	66	5,826.718	2,594.222	16,299.978	45.278	5,138.825	1,849,977.172
LAT67S-Mn	67	5,871.106	2,492.137	15,658.556	43.496	4,941.247	1,778,849.036
LAT68S-Mn	68	5,913.706	2,389.292	15,012.365	41.701	4,742.164	1,707,179.045
LAT69S-Mn	69	5,954.504	2,285.720	14,361.602	39.893	4,541.636	1,634,989.031
LAT70S-Mn	70	5,993.488	2,181.451	13,706.463	38.074	4,339.725	1,562,300.983
LAT71S-Mn	71	6,030.647	2,076.518	13,047.149	36.242	4,136.492	1,489,137.044
LAT72S-Mn	72	6,065.969	1,970.953	12,383.861	34.400	3,931.999	1,415,519.498
LAT73S-Mn	73	6,099.443	1,864.787	11,716.801	32.547	3,726.308	1,341,470.772
LAT74S-Mn	74	6,131.059	1,758.053	11,046.172	30.684	3,519.482	1,267,013.421
LAT75S-Mn	75	6,160.807	1,650.783	10,372.178	28.812	3,311.584	1,192,170.126
LAT76S-Mn	76	6,188.679	1,543.011	9,695.024	26.931	3,102.677	1,116,963.683
LAT77S-Mn	77	6,214.666	1,434.769	9,014.917	25.041	2,892.825	1,041,417.003
LAT78S-Mn	78	6,238.759	1,326.089	8,332.064	23.145	2,682.092	965,553.097
LAT79S-Mn	79	6,260.953	1,217.006	7,646.674	21.241	2,470.542	889,395.075
LAT80S-Mn	80	6,281.239	1,107.552	6,958.954	19.330	2,258.239	812,966.133
LAT81S-Mn	81	6,299.612	997.760	6,269.114	17.414	2,045.249	736,289.555
LAT82S-Mn	82	6,316.065	887.665	5,577.364	15.493	1,831.635	659,388.696
LAT83S-Mn	83	6,330.595	777.299	4,883.916	13.566	1,617.464	582,286.980
LAT84S-Mn	84	6,343.197	666.697	4,188.980	11.636	1,402.800	505,007.894
LAT85S-Mn	85	6,353.866	555.891	3,492.768	9.702	1,187.708	427,574.978
LAT86S-Mn	86	6,362.600	444.916	2,795.492	7.765	972.255	350,011.819
LAT87S-Mn	87	6,369.396	333.806	2,097.364	5.826	756.506	272,342.042
LAT88S-Mn	88	6,374.252	222.594	1,398.598	3.885	540.526	194,589.307
LAT89S-Mn	89	6,377.166	111.314	699.405	1.943	324.381	116,777.299
LAT90S-Mn	90	6,378.137	0.000	0.000	0.000	108.138	38,929.719

Table-2: Latitudes' Cell eMap 1° Information Table

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Table-2 above shows LAT Cell eMap in 1° layout with details of Latitudes' high, Latitudes' radius, Latitudes' circumference, Latitudes' arc length, LAT Cell eMaps' area. Start from the Equator, **LAT00E-M0** stands for Latitude at 0° (Equator) and Meridian 0 at 0° showing in yellow highlight. The excel table above was calculated by:

$$\begin{aligned} \text{LAT}(\text{high}) &= \text{SIN}([\text{LATd}^\circ] * (\text{PI}() / 180)) * 6378.137; && \rightarrow [\text{see column 3}] \\ \text{LAT}(\text{radius}) &= \text{COS}((\text{LATd}^\circ) * (\text{PI}() / 180)) * 6378.137; && \rightarrow [\text{see column 4}] \\ \text{LAT}(\text{Cir}) &= 2 * [\text{LAT}(\text{radius})] * \text{PI}(); \text{LAT}(\text{Arc}) = \text{LAT}(\text{Cir}) / 360; && \rightarrow [\text{see column 5}] \\ \text{LAT}(\text{Arc}) &= \text{LAT}(\text{Cir}) / 360; && \rightarrow [\text{see column 6}] \\ \text{LAT}(\text{CellMapArea}) &= 2 * \text{PI}() * 6378.137 * \text{ABS}((\text{LAT}_n(\text{high}) - \text{LAT}_{(n-1)}(\text{high})) / 360); \\ \text{LAT}(\text{RingArea}) &= \text{LAT}(\text{CellMapArea}) * 360; && \rightarrow [\text{see column 8}] \end{aligned}$$

This table data represents for each meridian of 1° **Rotational Zone** surface; there are total of 360 rotational zone surfaces for 1° meridian layout. However, with this new format we can specify fractional degree for each LAT cell for more accuracy.

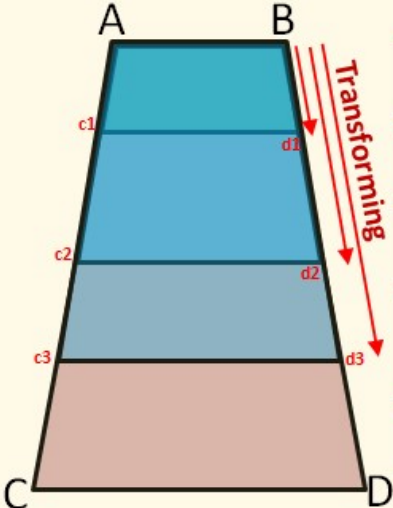
## Find a point of interest Cell eMap on Earth

Let's find a point of interest Cell eMap on earth with this new method for a given location Anaheim California USA, Disneyland located at **33° 48' 37" N 117° 55' 08" W**. We can convert this format to decimal degree format as 33.81049°, -117.91900°; then write this in new format as **LAT33.81049N-M242.081**. Note that the new format we do not use negative degree or negative direction; so -117.91900° will be converted as 360° - 117.91900° = 242.081°. Now we can say the Disneyland is located at the Cell eMap within Latitude 33 and Latitude 34 and within Meridian 242 and Meridian 243. From Table-2 above we have LAT Cell eMap area at latitude 33 is LAT33-M242(Area) = 10,333.406 km<sup>2</sup>; LAT33(Arc) = 93.3604 km; so there are about total of 101.65 cells in 1km<sup>2</sup> cell for highest mapping resolution. Figure-7 below shows the calculations for Disneyland position **m'** in the coordinates of Isosceles Trapezoid **O<sub>1</sub>m<sub>1</sub>O<sub>2</sub>m<sub>2</sub>** relative to the origin position **O<sub>1</sub>**, the starting point of LAT33-M242 Cell eMap for 1° layout.

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The **Parallel Transforming Percentage P%** calculations for any shapes or objects in parallel transforming or zooming relative to a line or a point of the original shape or object, provide the following formulas for the Isosceles Trapezoid shape as below.



$Bd_n = (P\%)(BD)$

$Bd_n = (P\%)(BD)$

$c_n d_n = (P\%)(CD - AB) + AB$

$Cir(ABd_n c_n) = (P\%)Cir(ABCD)$

$Area(ABd_n c_n) = \left[ (P\%) \sqrt{Area(ABCD)} \right]^2$

**P: Percentage or Ratio to ABC shape/line**

**Isosceles Trapezoid Formulas to calculate parallel transforming shape for Length, Circumferences, Area by percentage of the based shape Using Parallel Shape Transformation Calculations Relative to Percentage or Ratio of a line.**

Reference-1: Parallel Transforming Percentage Calculations

Applying the Parallel Transforming Percentage P% calculations, we can calculate positions relatively to some well known positions on Cell eMap. We have,

$$O'm' = (P\%)(O_1m_1 - O_2m_2) + O_2m_2; \text{ then}$$

$$O'm' = (100\% - 81.049\%)(O_1m_1 - O_2m_2) + O_2m_2 = 0.18951 * 0.086864 + 7.475328;$$

$$O'm' = 7.49179 \text{ km.}$$

$$O_1O' = (P\%)(111.319 \text{ km}) = 0.81049 * 111.319 \text{ km} = 90.22334 \text{ km.}$$

We can conclude that the Disneyland position at **m'** is **7.49179 km** in positive direction away from the meridian 242; and **90.22334 km** in positive north direction away from LAT33. With this calculation, the Cell eMap system will be easier to pin point or navigate to points of interest within the Cell eMap relative to the well known positions on the Cell eMap. The known positions on Cell eMap like the 4-corners and 4-lines of Cell eMap that can be predefined; this calculation will provide the navigation system for smart devices easier to calculate and help Self-Driving Cars more accurate in the future using **LPS Navigation System** which applying the **LPS – Local Positioning System** (the invention that was submitted on 2021/10/23; **PCT/IB2021/0000949**).

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Given Anaheim CA, Disneyland location  
in current format at 33° 48' 37" N 117° 55' 08" W.

Convert this to Decimal Degree (33.81049, -117.91900).  
With this new method, we can write LAT33.81049N-M242.081

Let find Disneyland located on LAT Cell number.

First, we have **LAT33-M242** in 1° map area of **10,333.406 km<sup>2</sup>**;  
with **LAT<sub>33</sub>Arc = 93.3604 km**; **LAT<sub>34</sub>Arc = 92.288 km**;  
and average Arc of **LAT33-LAT34 = 111.319 km**.

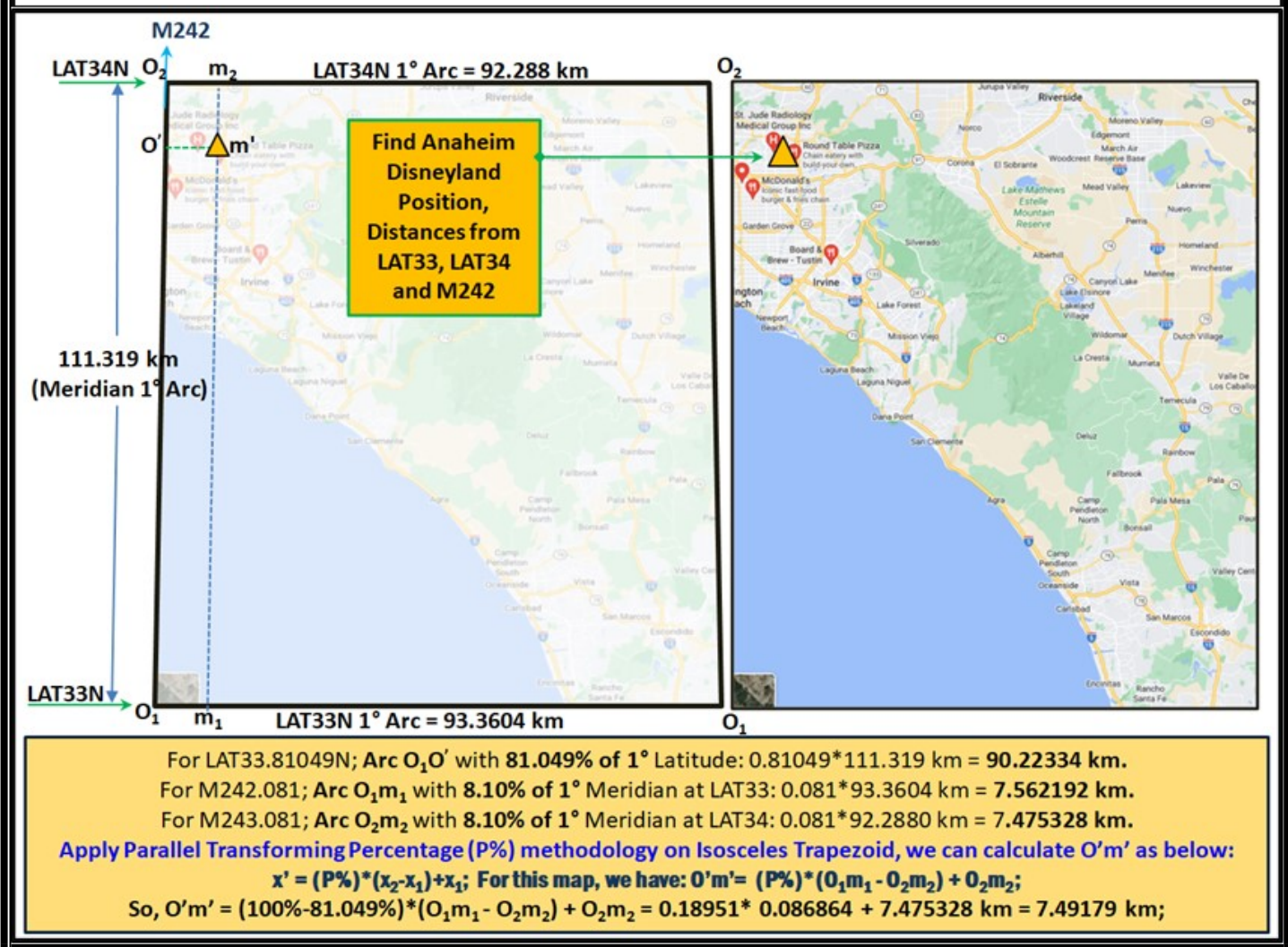


Figure-7: Locate Point of Interest LAT Cell eMap Example

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## High Resolution - The 1km<sup>2</sup> Cell eMap Format & Layout

The highest resolution cell map will be defined based on 1° Latitudes and Meridians for the 1km<sup>2</sup> Cell eMap layouts for more details with approximately one km<sup>2</sup>. Figure-8 below shows the layout and format of the 1km<sup>2</sup> Cell eMap at LAT33, LAT34 and border of LAT35. We have LAT33 with 93.360 km; rounding up to 1km in length we can have total of 94 equal lines. Each line is about 993.195538 meters; so we have total of 94 cells across this arc of LAT33. LAT34 with 92.288 km; rounding up to 1km in length we can have total of 93 equal lines. Each line is about 992.344521 meters; so we have total 93 cells across this arc of LAT34. The equals distances between each Latitudes in 1° layout is about 111.319 km; rounding up to 1km in length we can have total of 112 cells across the arc of 1° between Latitudes. With this division, we have total of  $(112 * 94) = 10,528$  cells of Isosceles Trapezoid shapes within LAT33-LAT34; and total of  $(112 * 93) = 10,416$  cells of Isosceles Trapezoid shapes within LAT34-LAT35. Applying the Parallel Transforming Percentage Calculations in Reference-1 above, we can calculate the length of any Isosceles Trapezoid shapes in those LAT33-LAT34 and LAT34-LAT35 based on the known values of 993.195538 meters and 992.344521 meters a cell length respectively.

With this division, we can write cell map in highest resolution, the 1km<sup>2</sup> cell e-map by rows (R in North or South Latitudes directions) and columns (C in Meridians direction) as LATdd-Mn- R<sub>L</sub>C<sub>M</sub>. Figure-8 below shows the LAT Cell eMap which Anaheim CA Disneyland located at which already shown in Figure-7 above; so we can write the format of first cell e-map in LAT33-M242-R1C1, second cell map LAT33-M242-R1C2, third cell map LAT33-M242-R1C3, etc... The calculation position **m'** in Figure-7 is **7.49179 km** in positive direction away from the meridian 242; and **90.22334 km** in positive north direction away from LAT33; and O'M is  $(100\% - 81.049\%) * (93.3604 - 92.288) + 92.288 = 92.491231$  km; cell length at **m'** is  $92.491231 / 94 = 0.98394926$  km; then **C=7.49179/0.98394926=7.614** and **R=90.22334/0.993924025=90.775**. So the 1km<sup>2</sup> Cell eMap of Anaheim CA Disneyland located at **LAT33-M242-R91C8**. The map

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navigation system will automatically joint or rejoin cell map when one reaching another.

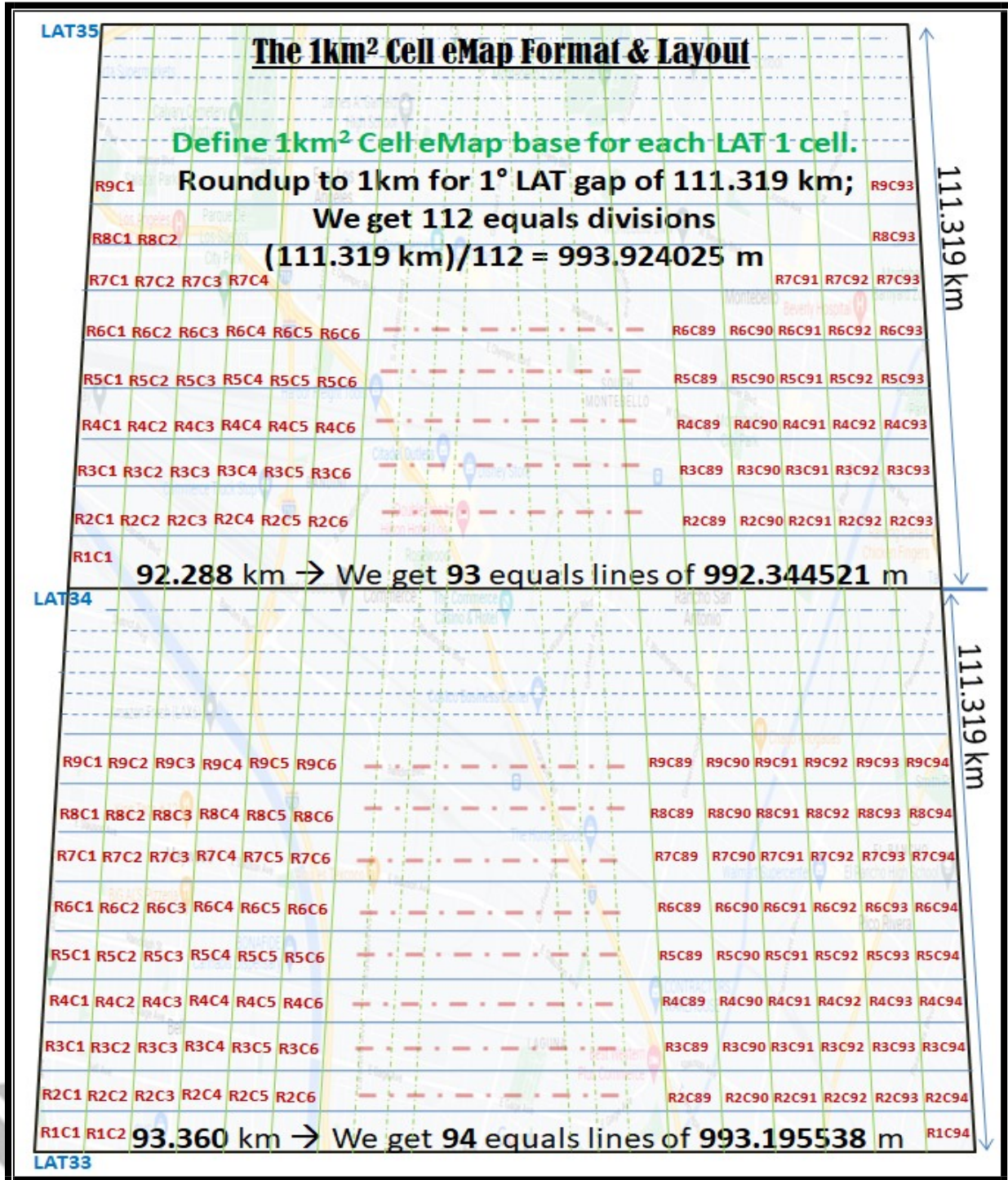


Figure-8: The 1km<sup>2</sup> Cell eMap Format & Layout

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## Cell eMap Layout for Broadcasting Towers

The Cell eMap layout in Figure-8 will be assigned to the broadcasting towers with number of Cell eMaps around the towers. Figure-9 below shows a simple layout of towers TR01, TR02, TR03 ... TR12; and the 1km<sup>2</sup> cell e-maps can be assigned within TR01-M1, TR01-M2, TR01-M3 and TR01-M4 for the 4 largest cells around TR01. The towers are not evenly distributed in reality, so one towers can handle number of 1km<sup>2</sup> cell e-maps more than the others. Figure-9 below shows the Tower eMaps around each tower in a perfect geometry. However, the Cell eMap Live Updates System can assign the way that fit its towers coverage depends on the distance between the towers. In city or crowded areas, the cell phone towers are closer than the urban area; so in urban areas, the towers can broadcast more Cell eMaps then crowded areas.

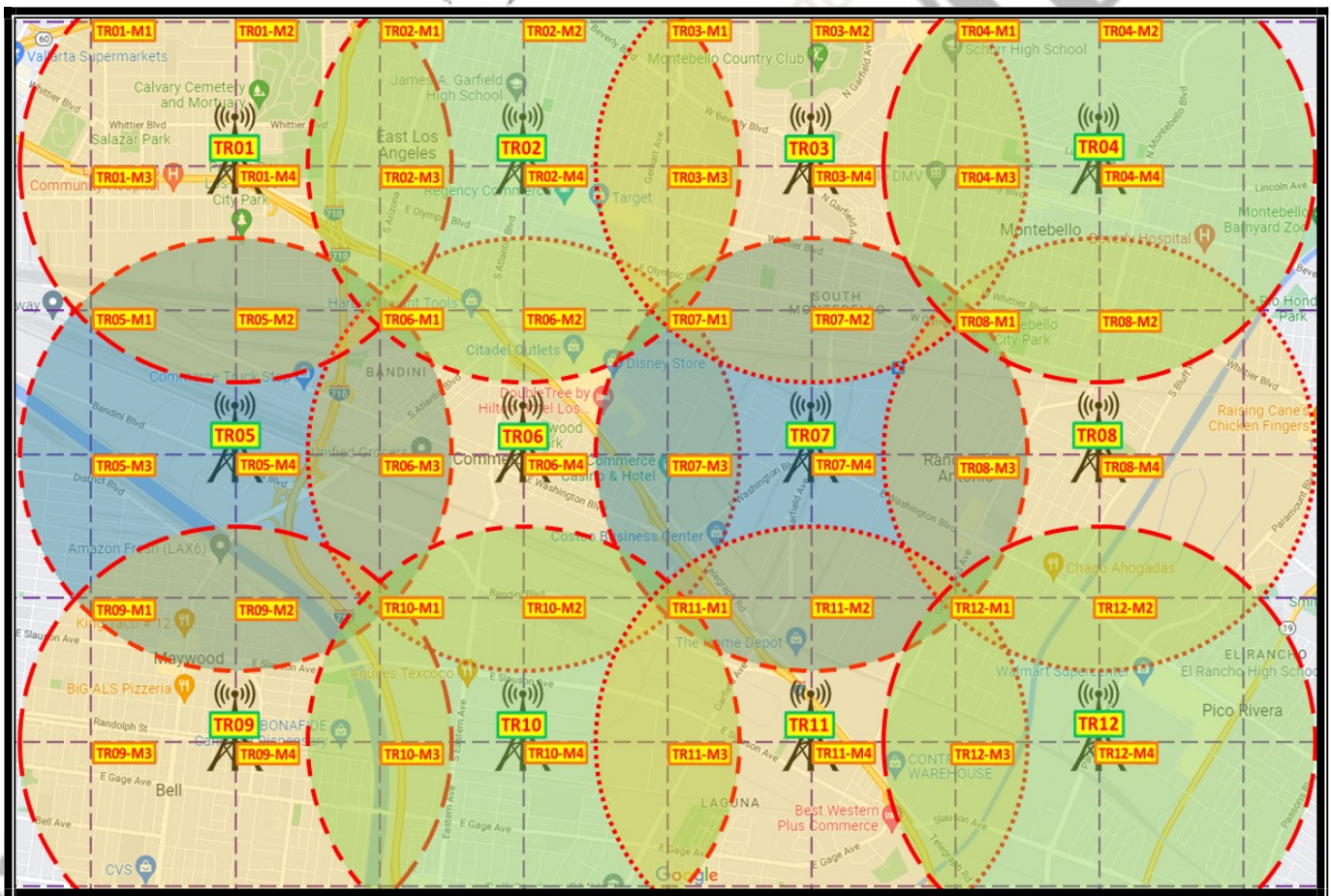


Figure-9: Cell eMap Towers Layout



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With current Cell Phone Towers coverage of about within 5 km to 10 km for old 3G and 5G networks respectively. For 5 km cell phone tower radius of coverage, each tower can be configured to handle 100 cell e-maps (10 km by 10 km) in average or approximately equals to 100 km<sup>2</sup>. The software can divide the map layout virtually within its 1° Cell eMap with its preset 4-corners positions and 4-lines lengths into grid layout as shown in Figure-8 and assign each cell phone tower handling cell maps around it. However, the current cell phone tower coverage can be improved to have the coverage overlapping to support backup coverage for emergency tower failure, power outage or for maintenance. Adding new broadcasting towers can be another option to provide broadcasting services.

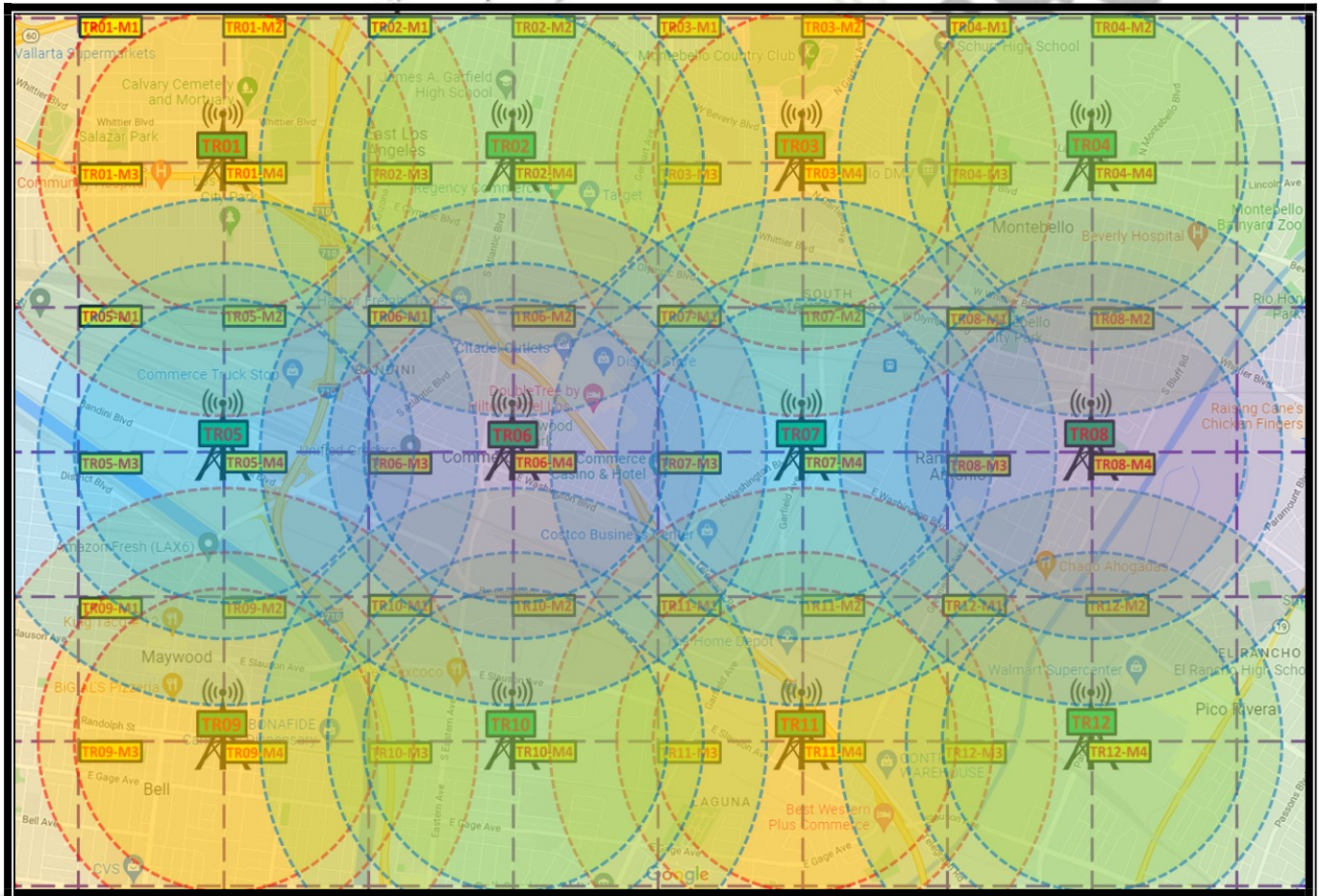


Figure-10: Cell eMap Broadcasting Towers

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## Conclusion

The **Cell eMap Live Updates System** is designed with State-of-the-Art and providing secured broadcasting cell e-maps for navigation systems. Broadcasting cell e-maps will prevent hacking or blocking from unwanted interrupters; and every smart device can able to receive cell e-maps on-the-go more privately without knowing from the others.

The important feature here is broadcasting cell e-maps; so the smart devices or smart cars do not need to have phone or internet services to receive the cell e-maps. In addition to this, local organizations can able to update their own local maps for their points of interest and live traffic notifications by their own and in their own languages. The local organizations can have the rights to support international language like English broadcasting along with the local language using **Language Tag** to support international travelers. This invention will prevent the navigation hacking issue on cars or smart devices use for navigating while travelling; and will support much easier navigating algorithms which works for one cell would work on the other cells.

This system is a promise mapping and navigating system for our future and our younger generations' futures for our smart world with the future supporting of **LPS Navigation System**. The LPS Navigation System will use LPS towers along the roads, along the freeway, across the neighbors, city-to-city to provide more accurate locations with this **Cell eMap Live Updates System**. More than just that; this new globe mapping layout of 10° and 1° LAT cell e-maps will help our astronauts, space vehicles, space stations, and future programs for Space Port, Space Links linking with our home, the earth more accurate than ever if we adding Cell eMap Towers along the Latitudes and Longitudes or Meridians. This new map layout with Cell eMap Towers can help to pin point lost of airplanes or greatly support Air Traffic Control, Air Defense, and UFV Unmanned Flying Vehicles better than ever.