COMCAST TELECOMMUNICATION COMPLAINTS PROJECT

IMPORTING LIBRARIES

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

LOADING DATASET

In [2]:
```
df = pd.read_csv(r"C:\Users\hermo\Downloads\1568699544_comcast_telecom_complaints_data\Comcast_telecom_complaints_data.csv")
```

In [3]:
```
df.head() # will give first five data present in the dataset
```

Out[3]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No

In [4]:
```
print(df.isnull().sum()) # find all the null values, if any , present in the dataset
```

```
Ticket #                       0
Customer Complaint             0
```

```
Date                           0
Date_month_year                0
Time                           0
Received Via                   0
City                           0
State                          0
Zip code                       0
Status                         0
Filing on Behalf of Someone    0
dtype: int64
```

There are no NaN values present in Dataset

In [5]:
```
df.describe(include='all')
```

Out[5]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
count	2224	2224	2224	2224	2224	2224	2224	2224	2224.000000	2224	2224
unique	2224	1841	91	91	2190	2	928	43	NaN	4	2
top	322882	Comcast	24-06-15	24-Jun-15	5:28:32 PM	Customer Care Call	Atlanta	Georgia	NaN	Solved	No
freq	1	83	218	218	2	1119	63	288	NaN	973	2021
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	47994.393435	NaN	NaN
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	28885.279427	NaN	NaN
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1075.000000	NaN	NaN
25%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	30056.500000	NaN	NaN
50%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	37211.000000	NaN	NaN
75%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	77058.750000	NaN	NaN
max	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	99223.000000	NaN	NaN

In [6]:
```
df.shape
```

Out[6]:
```
(2224, 11)
```

```
In [7]:  df=df.drop(['Ticket #','Time'], axis=1)
```

```
In [8]:  df.head()
```

Out[8]:

	Customer Complaint	Date	Date_month_year	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
0	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	Payment disappear - service got disconnected	04-08-15	04-Aug-15	Internet	Acworth	Georgia	30102	Closed	No
2	Speed and Service	18-04-15	18-Apr-15	Internet	Acworth	Georgia	30101	Closed	Yes
3	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	05-Jul-15	Internet	Acworth	Georgia	30101	Open	Yes
4	Comcast not working and no service to boot	26-05-15	26-May-15	Internet	Acworth	Georgia	30101	Solved	No

Task#1: Provide the trend chart for the number of complaints at monthly and daily granularity level

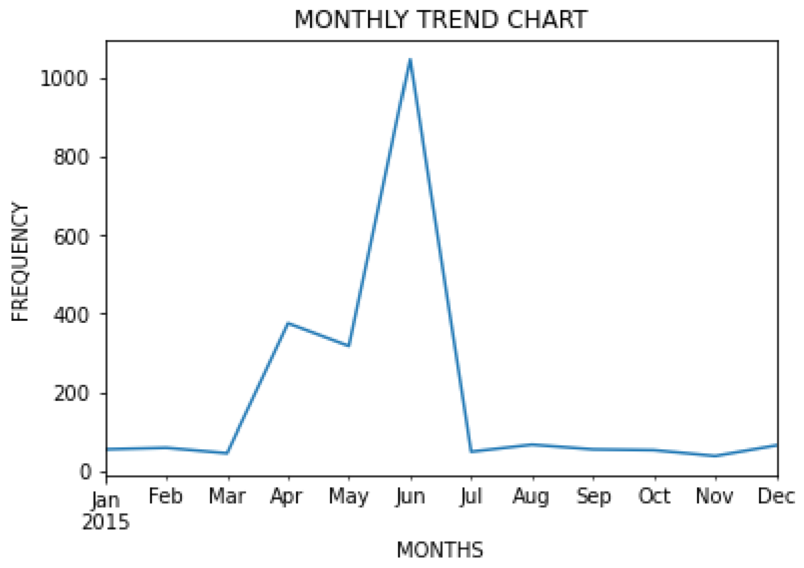
```
In [9]:  # pandas to_datetime() method helps to convert string date time into python date time object
         df['Date_month_year']=df['Date_month_year'].apply(pd.to_datetime)

         # Setting 'Date_month_year' as index
         df=df.set_index('Date_month_year')
```

Plotting monthly chart

```
In [10]:  # dataframe.groupby() function is splitting the data into groups according to frequency
          months=df.groupby(pd.Grouper(freq="M")).size().plot()
          plt.xlabel("MONTHS")
          plt.ylabel("FREQUENCY")
          plt.title("MONTHLY TREND CHART")
```

```
Out[10]: Text(0.5, 1.0, 'MONTHLY TREND CHART')
```



INSIGHTS:- From the above trend chart, we can clearly see that complaints for the month of June 2015 are maximum

In [11]:

```
#value_counts() function is getting a Series containing counts of unique values for Date column.
df['Date'].value_counts(dropna=False)[:8]
```

Out[11]:

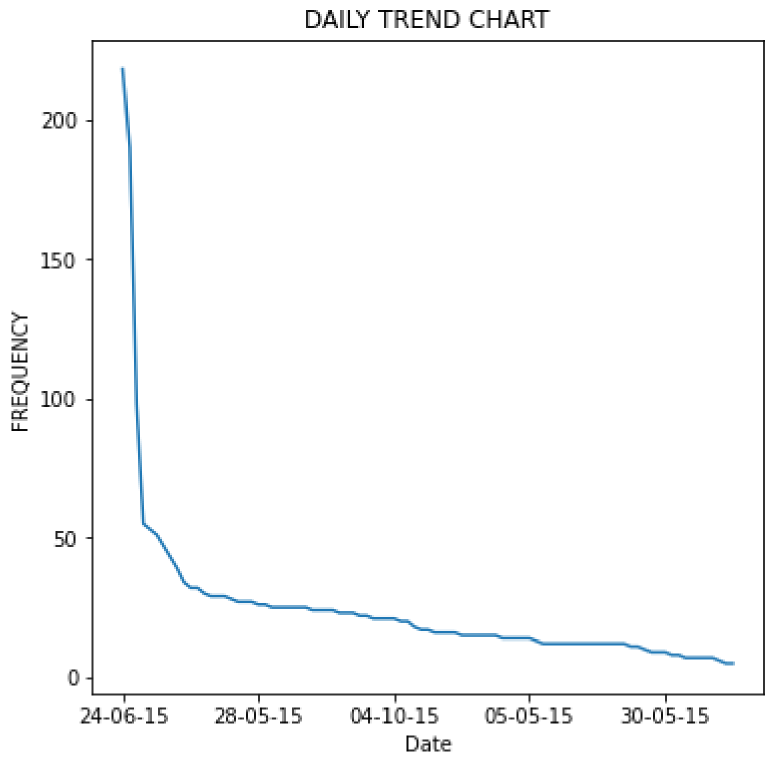
```
24-06-15    218
23-06-15    190
25-06-15     98
26-06-15     55
30-06-15     53
29-06-15     51
18-06-15     47
06-12-15     43
Name: Date, dtype: int64
```

plotting daily chart

In [12]:

```
df= df.sort_values(by='Date')
plt.figure(figsize=(6,6))
df['Date'].value_counts().plot()
plt.xlabel("Date")
plt.ylabel("FREQUENCY")
plt.title("DAILY TREND CHART")
```

```
Out[12]: Text(0.5, 1.0, 'DAILY TREND CHART')
```



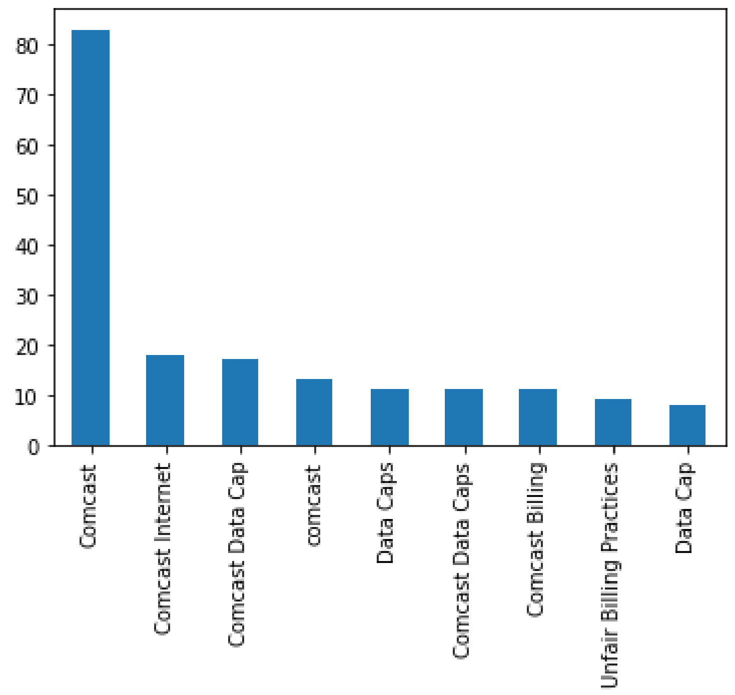
Task#2: Provide a table with the frequency of complaint types.

```
In [13]: df['Customer Complaint'].value_counts(dropna=False)[:9]
```

```
Out[13]: Comcast                         83
         Comcast Internet                18
         Comcast Data Cap                17
         comcast                         13
         Data Caps                       11
         Comcast Data Caps               11
         Comcast Billing                 11
         Unfair Billing Practices         9
         Data Cap                         8
         Name: Customer Complaint, dtype: int64
```

```
In [14]: df['Customer Complaint'].value_counts(dropna=False)[:9].plot.bar()
```

```
Out[14]: <AxesSubplot:>
```



Task#3: Which complaint types are maximum i.e., around internet, network issues, or across any other domains.

```
In [15]: internet_issues1=df[df['Customer Complaint'].str.contains("network")].count()
```

```
In [16]: internet_issues2=df[df['Customer Complaint'].str.contains("speed")].count()
```

```
In [17]: internet_issues3=df[df['Customer Complaint'].str.contains("data")].count()
```

```
In [18]: internet_issues4=df[df['Customer Complaint'].str.contains("internet")].count()
```

```
In [19]: billing_issues1=df[df['Customer Complaint'].str.contains("bill")].count()
```

```
In [20]:
```

```
billing_issues2=df[df['Customer Complaint'].str.contains("billing")].count()
```

In [21]:
```
billing_issues3=df[df['Customer Complaint'].str.contains("charges")].count()
```

In [22]:
```
service_issues1=df[df['Customer Complaint'].str.contains("service")].count()
```

In [23]:
```
service_issues2=df[df['Customer Complaint'].str.contains("customer")].count()
```

In [24]:
```
total_internet_issues=internet_issues1+internet_issues2+internet_issues3+internet_issues4
print(total_internet_issues)
```

```
Customer Complaint             374
Date                           374
Received Via                   374
City                           374
State                          374
Zip code                       374
Status                         374
Filing on Behalf of Someone    374
dtype: int64
```

In [25]:
```
total_billing_issues=billing_issues1+billing_issues2+billing_issues3
print(total_billing_issues)
```

```
Customer Complaint             353
Date                           353
Received Via                   353
City                           353
State                          353
Zip code                       353
Status                         353
Filing on Behalf of Someone    353
dtype: int64
```

In [26]:
```
total_service_issues=service_issues1+service_issues2
print(total_service_issues)
```

```
Customer Complaint             360
```

```
Date                           360
Received Via                   360
City                           360
State                          360
Zip code                       360
Status                         360
Filing on Behalf of Someone    360
dtype: int64
```

In [27]:

```
other_issues=2224-(total_internet_issues+total_billing_issues+total_service_issues)
print(other_issues)
```

```
Customer Complaint             1137
Date                           1137
Received Via                   1137
City                           1137
State                          1137
Zip code                       1137
Status                         1137
Filing on Behalf of Someone    1137
dtype: int64
```

INSIGHTS:- From the above analysis we can see that the other issues are maximum.

Task#4: Create a new categorical variable with value as Open and Closed. Open & Pending is to be categorized as Open and Closed & Solved is to be categorized as Closed.

In [28]:

```
df.Status.unique()
```

Out[28]:

```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

In [29]:

```
df["newStatus"] = ["Open" if Status=="Open" or Status=="Pending" else "Closed" for Status in df["Status"]]
df= df.drop(['Status'], axis=1)
df
```

Out[29]:

	Customer Complaint	Date	Received Via	City	State	Zip code	Filing on Behalf of Someone	newStatus
Date_month_year								
2015-01-04	Fraudulent claims reported to collections agency	04-01-15	Customer Care Call	Atlanta	Georgia	30312	No	Closed

	Customer Complaint	Date	Received Via	City	State	Zip code	Filing on Behalf of Someone	newStatus
Date_month_year								
2015-01-04	Comcast refusal of service	04-01-15	Customer Care Call	Wayne	Pennsylvania	19087	No	Closed
2015-01-04	Comcast Cable	04-01-15	Internet	Franklin	Tennessee	37067	No	Closed
2015-01-04	Data Overages	04-01-15	Internet	Savannah	Georgia	31406	No	Closed
2015-01-04	Comcast	04-01-15	Internet	North Huntingdon	Pennsylvania	15642	No	Closed
...	...	...	...	...	...	...	...	...
2015-05-31	Comcast	31-05-15	Customer Care Call	Beaverton	Oregon	97006	No	Open
2015-05-31	Comcast of East Windsor NJ Complaint	31-05-15	Internet	East Windsor	New Jersey	8520	No	Open
2015-05-31	n/a (b) (6)	31-05-15	Internet	Loganville	Georgia	30052	No	Open
2015-05-31	Complaint against Comcast for incredibly bad s...	31-05-15	Customer Care Call	Edgewood	Washington	98372	No	Open
2015-05-31	Questionable internet slowdown	31-05-15	Customer Care Call	Peabody	Massachusetts	1960	No	Closed

2224 rows × 8 columns

Task#5: Which state has the maximum complaints

In [30]:
```
df.groupby(["State"]).size().sort_values(ascending=False)[:5]
```

Out[30]:
```
State
Georgia       288
Florida       240
California    220
Illinois      164
```

```
Tennessee     143
dtype: int64
```

INSIGHTS:- From the above table, we can clearly see that Georgia has maximum complaints.

Task#6: Provide state wise status of complaints in a stacked bar chart.

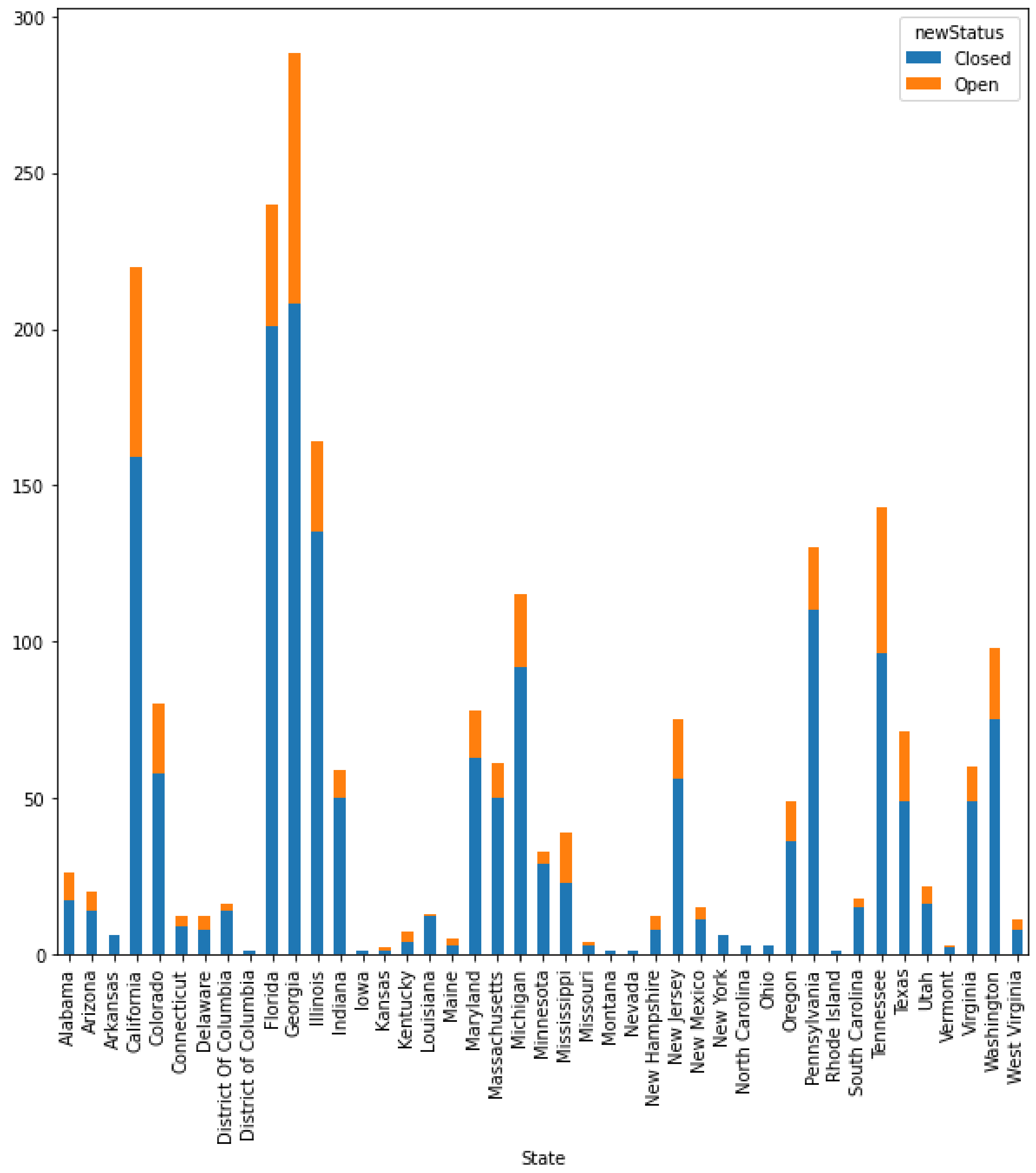
In [31]:
```
Status_complaints = df.groupby(["State","newStatus"]).size().unstack()
print(Status_complaints)
```

```
newStatus             Closed  Open
State
Alabama                 17.0   9.0
Arizona                 14.0   6.0
Arkansas                 6.0   NaN
California             159.0  61.0
Colorado                58.0  22.0
Connecticut              9.0   3.0
Delaware                 8.0   4.0
District Of Columbia    14.0   2.0
District of Columbia     1.0   NaN
Florida                201.0  39.0
Georgia                208.0  80.0
Illinois               135.0  29.0
Indiana                 50.0   9.0
Iowa                     1.0   NaN
Kansas                   1.0   1.0
Kentucky                 4.0   3.0
Louisiana               12.0   1.0
Maine                    3.0   2.0
Maryland                63.0  15.0
Massachusetts           50.0  11.0
Michigan                92.0  23.0
Minnesota               29.0   4.0
Mississippi             23.0  16.0
Missouri                 3.0   1.0
Montana                  1.0   NaN
Nevada                   1.0   NaN
New Hampshire            8.0   4.0
New Jersey              56.0  19.0
New Mexico              11.0   4.0
New York                 6.0   NaN
North Carolina           3.0   NaN
Ohio                     3.0   NaN
Oregon                  36.0  13.0
Pennsylvania           110.0  20.0
```

```
Rhode Island             1.0   NaN
South Carolina          15.0   3.0
Tennessee               96.0  47.0
Texas                   49.0  22.0
Utah                    16.0   6.0
Vermont                  2.0   1.0
Virginia                49.0  11.0
Washington              75.0  23.0
West Virginia            8.0   3.0
```

In [32]:
```
Status_complaints.plot.bar(figsize=(10,10), stacked=True)
```

Out[32]:
```
<AxesSubplot:xlabel='State'>
```



INSIGHTS:- From the above chart, we can clearly see that Georgia has maximum complaints.

Task#7: state which has the highest percentage of unresolved complaints

In [33]:
```
print(df['newStatus'].value_counts())
```

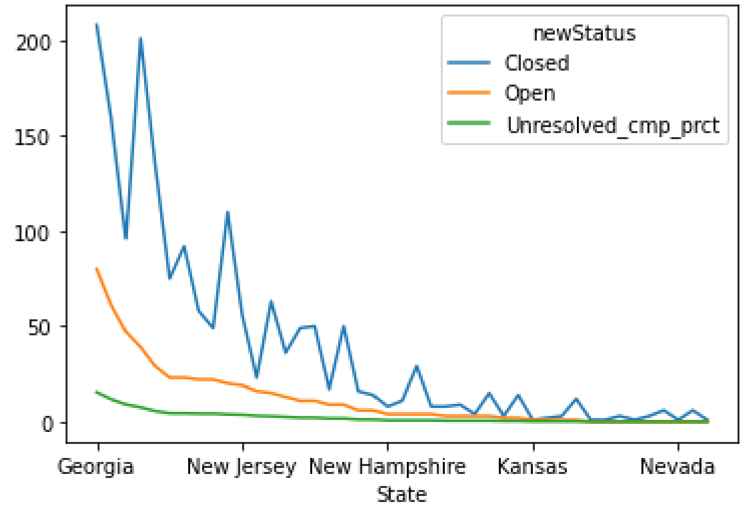
```
Closed    1707
Open       517
Name: newStatus, dtype: int64
```

In [34]:
```
unresolved_data = df.groupby(["State",'newStatus']).size().unstack().fillna(0).sort_values(by='Open',ascending=False)
unresolved_data['Unresolved_cmp_prct'] = unresolved_data['Open']/unresolved_data['Open'].sum()*100
print(unresolved_data)
unresolved_data.plot()
```

```
newStatus             Closed  Open  Unresolved_cmp_prct
State
Georgia                208.0  80.0            15.473888
California             159.0  61.0            11.798839
Tennessee               96.0  47.0             9.090909
Florida                201.0  39.0             7.543520
Illinois               135.0  29.0             5.609284
Washington              75.0  23.0             4.448743
Michigan                92.0  23.0             4.448743
Colorado                58.0  22.0             4.255319
Texas                   49.0  22.0             4.255319
Pennsylvania           110.0  20.0             3.868472
New Jersey              56.0  19.0             3.675048
Mississippi             23.0  16.0             3.094778
Maryland                63.0  15.0             2.901354
Oregon                  36.0  13.0             2.514507
Virginia                49.0  11.0             2.127660
Massachusetts           50.0  11.0             2.127660
Alabama                 17.0   9.0             1.740812
Indiana                 50.0   9.0             1.740812
Utah                    16.0   6.0             1.160542
Arizona                 14.0   6.0             1.160542
New Hampshire            8.0   4.0             0.773694
New Mexico              11.0   4.0             0.773694
Minnesota               29.0   4.0             0.773694
Delaware                 8.0   4.0             0.773694
West Virginia            8.0   3.0             0.580271
Connecticut              9.0   3.0             0.580271
Kentucky                 4.0   3.0             0.580271
South Carolina          15.0   3.0             0.580271
Maine                    3.0   2.0             0.386847
District Of Columbia    14.0   2.0             0.386847
```

```
Kansas                  1.0   1.0            0.193424
Vermont                 2.0   1.0            0.193424
Missouri                3.0   1.0            0.193424
Louisiana              12.0   1.0            0.193424
Montana                 1.0   0.0            0.000000
Rhode Island            1.0   0.0            0.000000
Ohio                    3.0   0.0            0.000000
District of Columbia    1.0   0.0            0.000000
North Carolina          3.0   0.0            0.000000
New York                6.0   0.0            0.000000
Nevada                  1.0   0.0            0.000000
Arkansas                6.0   0.0            0.000000
Iowa                    1.0   0.0            0.000000
```

Out[34]:
```
<AxesSubplot:xlabel='State'>
```



INSIGHTS:- From the table generated above we can see that Georgia has maximum unresolved complaints i.e. 80.

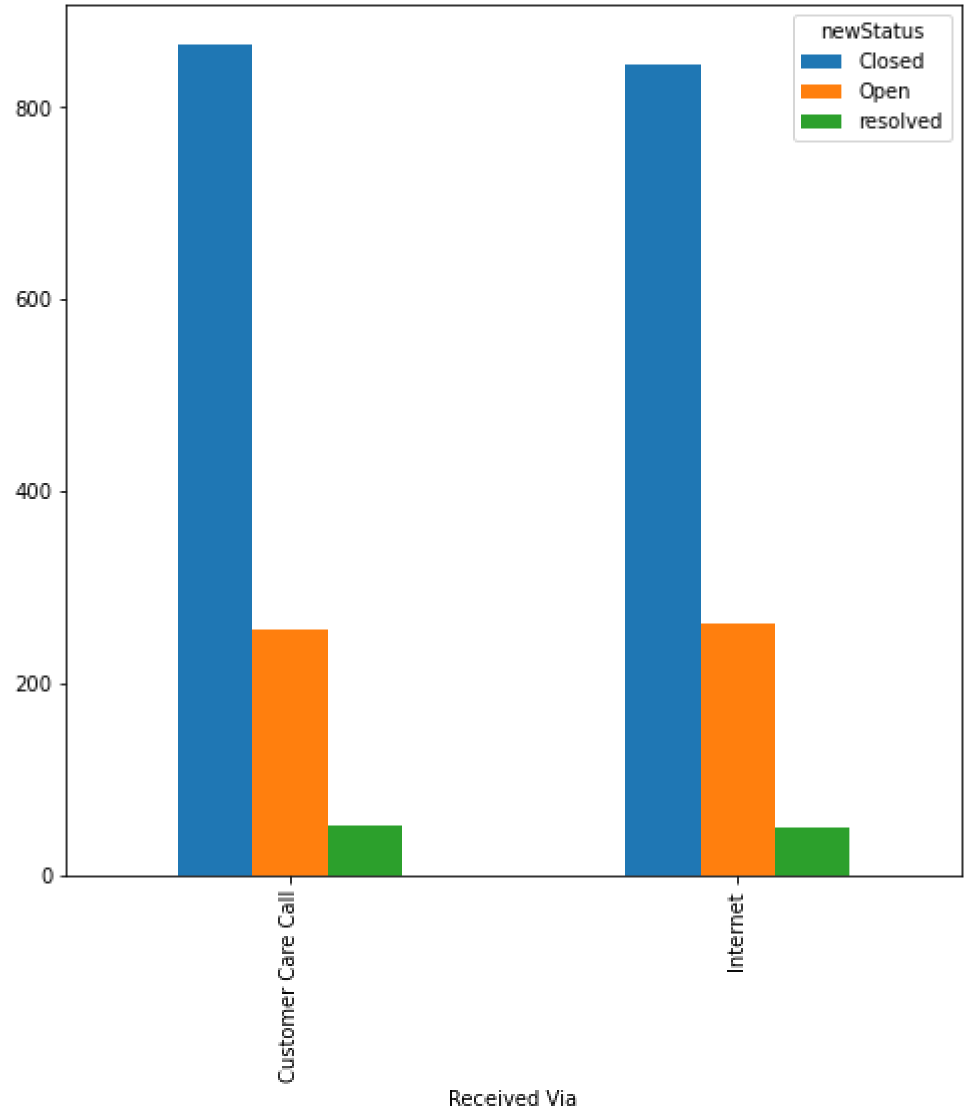
Task#8: Provide the percentage of complaints resolved till date, which were received through the Internet and customer care calls

In [35]:
```
resolved_data = df.groupby(['Received Via','newStatus']).size().unstack().fillna(0)
resolved_data['resolved'] = resolved_data['Closed']/resolved_data['Closed'].sum()*100
resolved_data['resolved']
```

Out[35]:
```
Received Via
Customer Care Call    50.615114
Internet              49.384886
Name: resolved, dtype: float64
```

In [36]:
```python
resolved_data.plot(kind="bar", figsize=(8,8))
```

Out[36]:
```
<AxesSubplot:xlabel='Received Via'>
```



INSIGHTS:- From the above pie chart we can clearly see that there are total 50.61% Complaints resolved for Customer Care Call and 49.39% for received via internet.

```
In [ ]:
```