In [1]:
```
## Import the required libraries
import numpy as np
import pandas as pd

## import matplot library
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:
```
#Importing comcast dataset
df_comcast = pd.read_csv('C:\\Users\\manok\\OneDrive\\Desktop\\Comcast\\Comcast_telecom_complaints_data.csv')
```

In [3]:
```
#View the first five observations of the dataset
df_comcast.head()
```

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]:
```
## Shape of the dataset
df_comcast.shape
```

Out[4]: (2224, 11)

In [5]:
```
## Combining the data and time column
df_comcast["Report_index"] = df_comcast["Date"] + " " + df_comcast["Time"]
```

In [5]:
```
## Combining the data and time column
df_comcast["Report_index"] = df_comcast["Date"] + " " + df_comcast["Time"]
```

In [6]:
```
df_comcast["Report_index"]
```

Out[6]:
```
0        22-04-15 3:53:50 PM
1       04-08-15 10:22:56 AM
2        18-04-15 9:55:47 AM
3       05-07-15 11:59:35 AM
4        26-05-15 1:25:26 PM
               ...
2219     04-02-15 9:13:18 AM
2220     06-02-15 1:24:39 PM
2221     06-09-15 5:28:41 PM
2222    23-06-15 11:13:30 PM
2223    24-06-15 10:28:33 PM
Name: Report_index, Length: 2224, dtype: object
```

In [7]:
```
## Converting the Date_month_year to the datetime format
df_comcast["Date_month_year"] = pd.to_datetime(df_comcast["Date_month_year"])
```

In [8]:
```
df_comcast["Date_month_year"].head()
```

Out[8]:
```
0   2015-04-22
1   2015-08-04
2   2015-04-18
3   2015-07-05
4   2015-05-26
Name: Date_month_year, dtype: datetime64[ns]
```

In [9]:
```
## Replacing the Index part with 'Report_index'
df_comcast = df_comcast.set_index(df_comcast["Report_index"])
```

In [10]:
```
df_comcast.head(3)
```

In [10]:
```
df_comcast.head(3)
```

Out[10]:

Report_index	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Report_index
22-04-15 3:53:50 PM	250635	Comcast Cable Internet Speeds	22-04-15	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	22-04-15 3:53:50 PM
04-08-15 10:22:56 AM	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	04-08-15 10:22:56 AM
18-04-15 9:55:47 AM	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	18-04-15 9:55:47 AM

In [11]:
```
## Get the No of complaints daywise
No_of_complaints_daywise = df_comcast["Date_month_year"].value_counts()
```

In [12]:
```
No_of_complaints_daywise
```

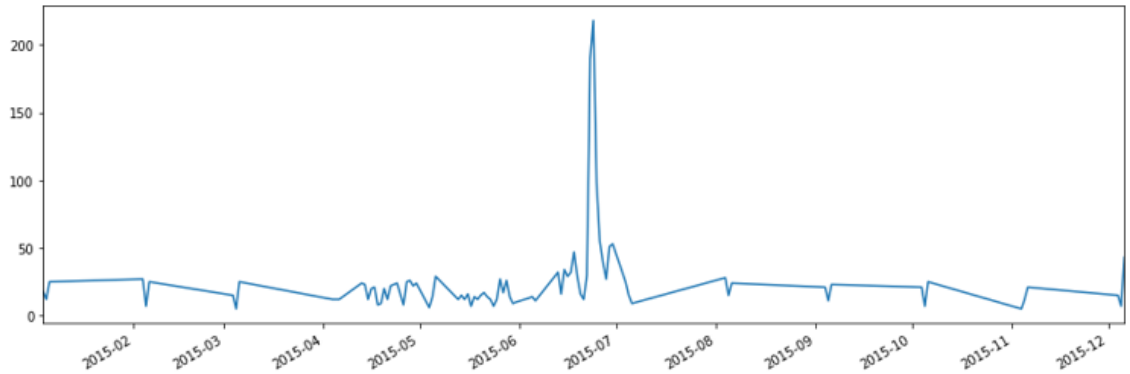
Out[12]:
```
2015-06-24    218
2015-06-23    190
2015-06-25     98
2015-06-26     55
2015-06-30     53
             ...
2015-05-17      7
2015-12-05      7
2015-05-04      6
2015-11-04      5
2015-03-05      5
Name: Date_month_year, Length: 91, dtype: int64
```

In [13]:
```
## Month wise plot
df_comcast_daywise_count = df_comcast["Date_month_year"].value_counts()
df_comcast_daywise_count.plot(figsize=(15,5))
```

Out[13]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x244255b6708>
```

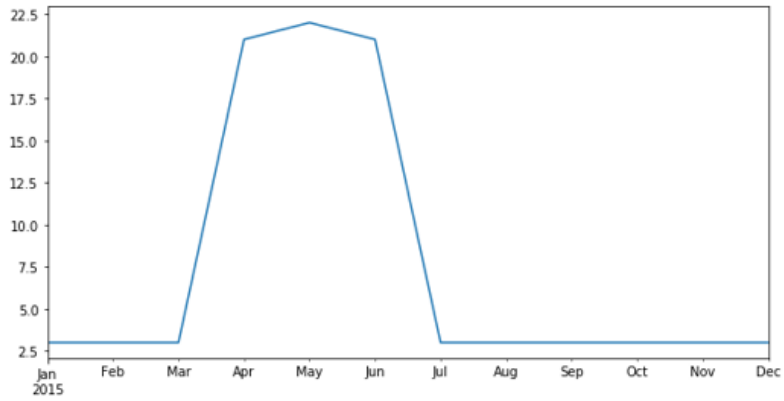
In [13]:
```
## Month wise plot
df_comcast_daywise_count = df_comcast["Date_month_year"].value_counts()
df_comcast_daywise_count.plot(figsize=(15,5))
```

Out[13]: <matplotlib.axes._subplots.AxesSubplot at 0x244255b6708>



In [14]:
```
df_comcast_Monthwise_count = No_of_complaints_daywise.groupby(pd.Grouper(freq="M")).size()
df_comcast_Monthwise_count.plot(figsize=(10,5))
```

Out[14]: <matplotlib.axes._subplots.AxesSubplot at 0x24429fd1648>



In [15]:
```
df_com = df_comcast.sort_values(by = 'Date_month_year',ascending=False)
```

In [16]:
```
df_com.head(3)
```

Out[16]:

Report_index	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Report_index
06-12-15 5:28:32 PM	337985	HBO shouldn't have a load time	06-12-15	2015-12-06	5:28:32 PM	Customer Care Call	Indianapolis	Indiana	46268	Solved	No	06-12-15 5:28:32 PM
06-12-15 7:31:37 PM	338283	monthly data caps	06-12-15	2015-12-06	7:31:37 PM	Customer Care Call	Gadsden	Alabama	35901	Solved	No	06-12-15 7:31:37 PM
06-12-15 11:52:11 PM	338606	Internet connection outage	06-12-15	2015-12-06	11:52:11 PM	Customer Care Call	Clarkston	Michigan	48346	Solved	No	06-12-15 11:52:11 PM

In [17]:
```
## Which complaint types are maximum i.e., around internet, network issues, or across any other domains.
## -  Create a new categorical variable with value as Open and Closed.
##      Open & Pending  --> OPEN
##      Closed & Solved --> CLOSED
## -  Provide state wise status of complaints in a stacked bar chart.
##      Use the categorized variable from Q3.
##      Provide insights on:
```

In [18]:
```
df_comcast.Status.unique()
```

Out[18]:
```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

In [19]:
```
df_comcast["NewStatus"] = ["Open" if Status== "Open" or
                                   Status== "Pending"
                           else "Closed"
                     for Status in df_comcast["Status"]]
```

In [20]:
```
df_comcast.head(3)
```

In [20]:
```
df_comcast.head(3)
```

Out[20]:

Report_index	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Report_index	NewStatus
22-04-15 3:53:50 PM	250635	Comcast Cable Internet Speeds	22-04-15	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	22-04-15 3:53:50 PM	Closed
04-08-15 10:22:56 AM	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	04-08-15 10:22:56 AM	Closed
18-04-15 9:55:47 AM	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	18-04-15 9:55:47 AM	Closed

In [21]:
```
df_comcast.groupby(["State"]).size().sort_values(ascending=False).to_frame().rename({0: "Count"}, axis=1).head()
```

Out[21]:

State	Count
Georgia	288
Florida	240
California	220
Illinois	164
Tennessee	143

In [22]:
```
Status_complaints = df_comcast.groupby(["State","NewStatus"]).size().unstack()
```

In [23]:
```
Status_complaints = Status_complaints.fillna(0)
Status_complaints.head(3)
```

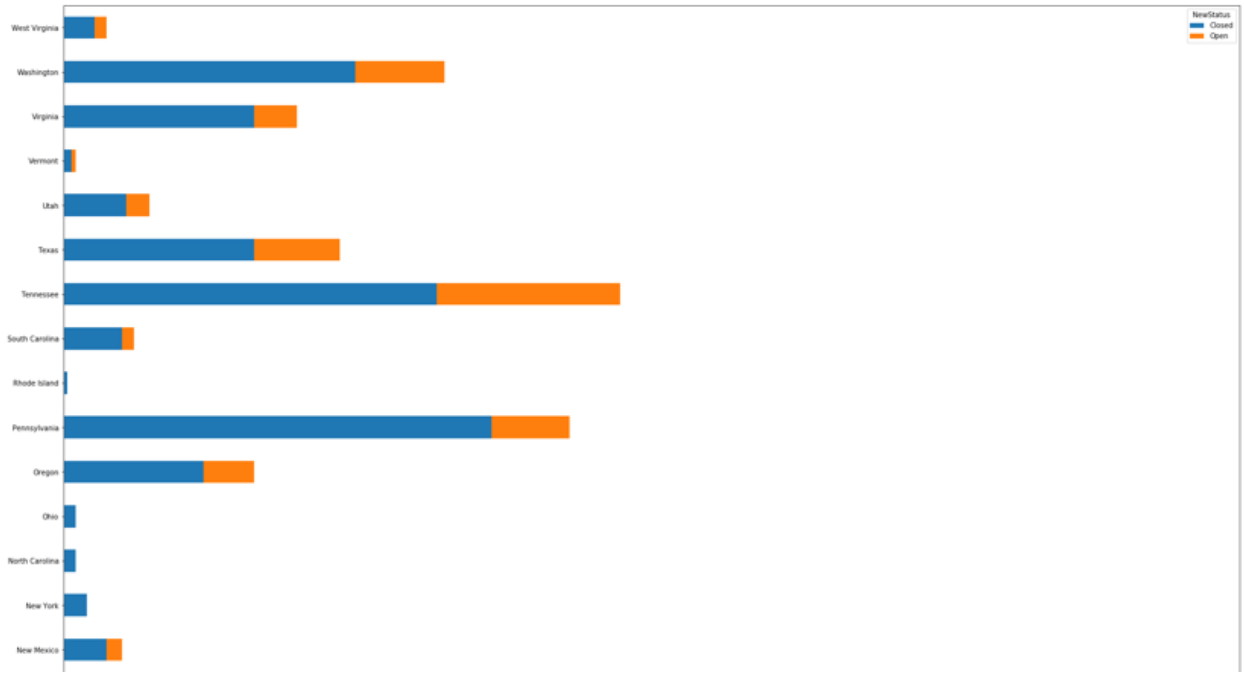
In [23]:
```
Status_complaints = Status_complaints.fillna(0)
Status_complaints.head(3)
```

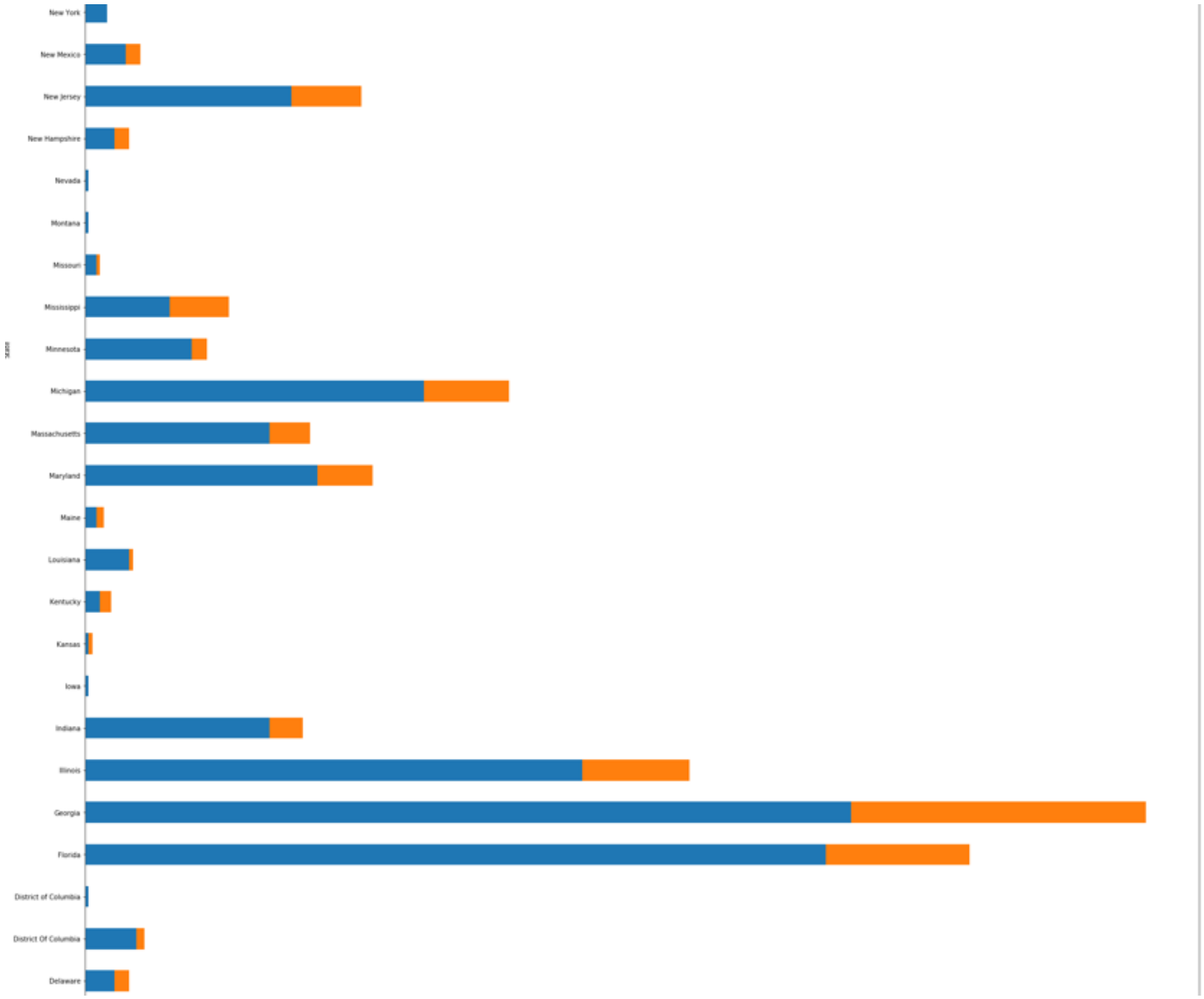
Out[23]:

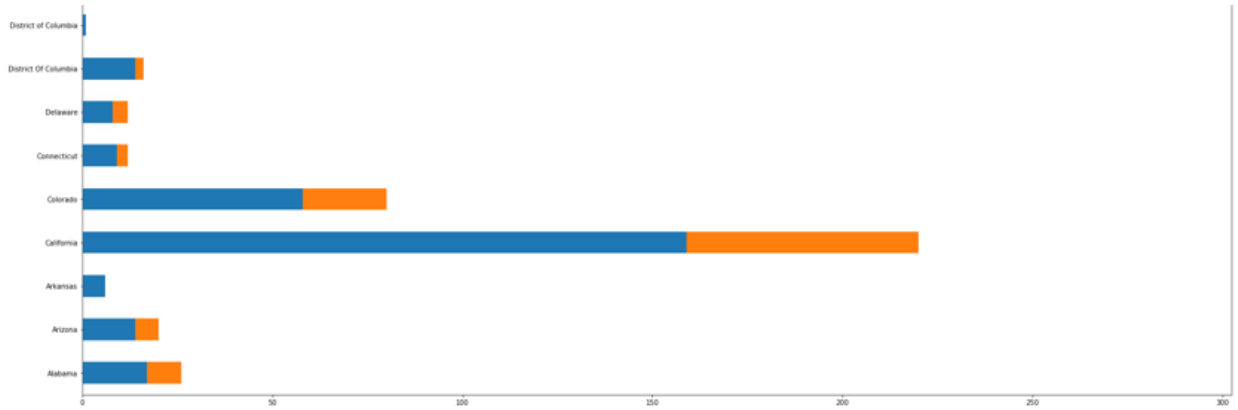
NewStatus	Closed	Open
State		
Alabama	17.0	9.0
Arizona	14.0	6.0
Arkansas	6.0	0.0

In [24]:
```
Status_complaints.plot(kind="barh", figsize=(30,50), stacked=True)
```

Out[24]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x24429ed3208>
```




State
New York
New Mexico
New Jersey
New Hampshire
Nevada
Montana
Missouri
Mississippi
Minnesota
Michigan
Massachusetts
Maryland
Maine
Louisiana
Kentucky
Kansas
Iowa
Indiana
Illinois
Georgia
Florida
District of Columbia
District Of Columbia
Delaware



In [25]:
```
### State has the maximum complaints
```

In [26]:
```
state_complaints = df_comcast.groupby(["State"]).size()
state_complaints.head()
```

Out[26]:
```
State
Alabama        26
Arizona        20
Arkansas        6
California    220
Colorado       80
dtype: int64
```

In [27]:
```
## State having Highest complaint
state_complaints_sort = state_complaints.sort_values(ascending=False)
state_complaints_sort.head()
```

Out[27]:
```
State
Georgia       288
Florida       240
California    220
Illinois      164
Tennessee     143
dtype: int64
```

In [28]:
```
## View the state complaints in dataframe format
df_state_complaints_sort1 = state_complaints_sort.to_frame()
df_state_complaints_sort1
## rename the column '0' as the count
State_max_complaints = df_state_complaints_sort1.rename({0: "Count"}, axis = 1)
State_max_complaints.head()
```

Out[28]:

State	Count
Georgia	288
Florida	240
California	220
Illinois	164
Tennessee	143

In [29]:
```
## No of complaints that are closed and opened status
Df_comcast_status = df_comcast.groupby(["State","NewStatus"]).size().unstack().fillna(0)
Df_comcast_status.sort_values(by ='Closed',ascending=False).head()
```

Out[29]:

State	Closed	Open
Georgia	208.0	80.0
Florida	201.0	39.0
California	159.0	61.0
Illinois	135.0	29.0
Pennsylvania	110.0	20.0

In [30]:
```
## Total closed complaints
Total_closed = Df_comcast_status['Closed'].sum()
Total_closed
```

Out[30]: 1707.0

In [31]:
```
## Total Open complaints
Total_open = Df_comcast_status['Open'].sum()
Total_open
```

In [31]:
```
## Total Open complaints
Total_open = Df_comcast_status['Open'].sum()
Total_open
```

Out[31]: 517.0

In [32]:
```
## Total complaints of the individual state
Df_comcast_status["Total complainints"] = Df_comcast_status["Closed"] + Df_comcast_status["Open"]
```

In [33]:
```
Total_complaints = Df_comcast_status["Total complainints"].sum()
Total_complaints
```

Out[33]: 2224.0

In [34]:
```
## Individual State close percentage of a state
Df_comcast_status["Closed%"] = ((Df_comcast_status["Closed"]/Total_closed)*100)
```

In [35]:
```
## Individual State open percentage of a state
Df_comcast_status["Open%"] = ((Df_comcast_status["Open"]/Total_open)*100)
```

In [38]:
```
## Statwise percentage of complaints
Df_comcast_status["Statwise_Perc_compl"] = ((Df_comcast_status["Total complainints"]/Total_complaints)*100)
```

In [39]:
```
Statwiste_comcast_status = Df_comcast_status.sort_values(by ='Closed',ascending=False)
Statwiste_comcast_status.head(5)
```

Out[39]:

NewStatus	Closed	Open	Total complainints	Closed%	Open%	Statwise_Perc_compl
State						
Georgia	208.0	80.0	288.0	12.185120	15.473888	12.949640
Florida	201.0	39.0	240.0	11.775044	7.543520	10.791367
California	159.0	61.0	220.0	9.314587	11.798839	9.892086
Illinois	135.0	29.0	164.0	7.908612	5.609284	7.374101
Pennsylvania	110.0	20.0	130.0	6.444054	3.868472	5.845324

In [40]:
```
df_comcast_received_via = df_comcast.filter(["Received Via","State","Status"])
```

In [41]:
```
df_comcast_received_via.head(10)
```

In [41]:
```
df_comcast_received_via.head(10)
```

Out[41]:

Report_index	Received Via	State	Status
22-04-15 3:53:50 PM	Customer Care Call	Maryland	Closed
04-08-15 10:22:56 AM	Internet	Georgia	Closed
18-04-15 9:55:47 AM	Internet	Georgia	Closed
05-07-15 11:59:35 AM	Internet	Georgia	Open
26-05-15 1:25:26 PM	Internet	Georgia	Solved
06-12-15 9:59:40 PM	Internet	Georgia	Solved
24-06-15 10:13:55 AM	Customer Care Call	Georgia	Pending
23-06-15 6:56:14 PM	Internet	Michigan	Solved
06-01-15 11:46:30 PM	Customer Care Call	California	Closed
28-06-15 6:46:31 PM	Customer Care Call	California	Open

In [42]:
```
df_comcast_received_via["NewStatus"] = ["Open" if Status== "Open" or
                                        Status== "Pending"
                                    else "Closed"
                                for Status in df_comcast["Status"]]
```

In [43]:
```
df_comcast_received_via
```

Out[43]:

Report_index	Received Via	State	Status	NewStatus
22-04-15 3:53:50 PM	Customer Care Call	Maryland	Closed	Closed
04-08-15 10:22:56 AM	Internet	Georgia	Closed	Closed
18-04-15 9:55:47 AM	Internet	Georgia	Closed	Closed
05-07-15 11:59:35 AM	Internet	Georgia	Open	Open
26-05-15 1:25:26 PM	Internet	Georgia	Solved	Closed
...	...	...	...	...
04-02-15 9:13:18 AM	Customer Care Call	Florida	Closed	Closed
06-02-15 1:24:39 PM	Customer Care Call	Michigan	Solved	Closed
06-09-15 5:28:41 PM	Internet	Michigan	Solved	Closed

In [43]:
```
df_comcast_received_via
```

Out[43]:

Report_index	Received Via	State	Status	NewStatus
22-04-15 3:53:50 PM	Customer Care Call	Maryland	Closed	Closed
04-08-15 10:22:56 AM	Internet	Georgia	Closed	Closed
18-04-15 9:55:47 AM	Internet	Georgia	Closed	Closed
05-07-15 11:59:35 AM	Internet	Georgia	Open	Open
26-05-15 1:25:26 PM	Internet	Georgia	Solved	Closed
...	...	...	...	...
04-02-15 9:13:18 AM	Customer Care Call	Florida	Closed	Closed
06-02-15 1:24:39 PM	Customer Care Call	Michigan	Solved	Closed
06-09-15 5:28:41 PM	Internet	Michigan	Solved	Closed
23-06-15 11:13:30 PM	Customer Care Call	Michigan	Solved	Closed
24-06-15 10:28:33 PM	Customer Care Call	Michigan	Open	Open

2224 rows × 4 columns

In [44]:
```
## Complaints received through the internet
df_comcast_received_via_int = (df_comcast_received_via ["Received Via"] == 'Internet')
```

In [45]:
```
Int = df_comcast_received_via[df_comcast_received_via_int]
```

In [46]:
```
Int1 = Int.groupby(["Received Via","NewStatus"]).size().unstack()
```

In [47]:
```
Internet_Closed = Int1['Closed'].sum()
Internet_Closed
```

Out[47]: 843

In [48]:
```
Internet_Open = Int1['Open'].sum()
Internet_Open
```

Out[48]: 262

In [49]:
```
Total_Internet_complaints = Internet_Closed + Internet_Open
Total_Internet_complaints
```

In [49]:
```
Total_Internet_complaints = Internet_Closed + Internet_Open
Total_Internet_complaints
```

Out[49]: 1105

In [50]:
```
## Complaints received through the 'customer care calls(CCC)'
df_comcast_received_via_CCC = (df_comcast_received_via ["Received Via"] == 'Customer Care Call')
```

In [51]:
```
CCC = df_comcast_received_via[df_comcast_received_via_CCC]
```

In [52]:
```
CCC1 = CCC.groupby(["Received Via","NewStatus"]).size().unstack()
```

In [53]:
```
CCC_Closed = CCC1['Closed'].sum()
CCC_Closed
```

Out[53]: 864

In [54]:
```
CCC_Open = CCC1['Open'].sum()
CCC_Open
```

Out[54]: 255

In [55]:
```
Total_CCC_complaints = CCC_Closed + CCC_Open
Total_CCC_complaints
```

Out[55]: 1119

In [56]:
```
## Percentage of complaints resolved till date, which were received through the Internet and customer care calls.
Total_Int_CCC = Total_Internet_complaints + Total_CCC_complaints
Total_Int_CCC
```

Out[56]: 2224

In [57]:
```
## Percentage of complaints resolved till date(Internet and customer care calls)
Complaints_Int_CCC_Resolved = Internet_Closed + CCC_Closed
Complaints_Int_CCC_Res_Per = ((Complaints_Int_CCC_Resolved/Total_Int_CCC)*100)
Complaints_Int_CCC_Res_Per
```

Out[57]: 76.75359712230215