Project - Comcast Telecom Consumer Complaints

In [1]:
```
# import required libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:
```
# Set working directory
import io
%cd "F:\Akshay\Simplilearn\Electives\PYTHON_DATA_SCIENCE\PROJECTS\Comcast Telecom Consumer Complaints"
```

```
F:\Akshay\Simplilearn\Electives\PYTHON_DATA_SCIENCE\PROJECTS\Comcast Telecom Consumer Complaints
```

Analysis Task

1. Import data into Python environment

In [3]:
```
# Import the dataset
Comcast_data = pd.read_csv('Comcast_telecom_complaints_data.csv')
Comcast_data.head() # first 5 records
```

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]:
```
Comcast_data.dtypes # check datatypes
```

Out[4]:
```
Ticket #                        object
Customer Complaint              object
Date                            object
Date_month_year                 object
Time                            object
Received Via                    object
City                            object
State                           object
Zip code                         int64
Status                          object
Filing on Behalf of Someone     object
dtype: object
```

In [5]:
```
Comcast_data.describe(include='all') # brief description of the dataset
```

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	244072	Comcast	24-06-15	24-Jun-15	11:40:30 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]:
```
Comcast_data.shape # Rows and Columns
```

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

In [7]:
```
# Check for missing values
Comcast_data.isnull().sum().sort_values(ascending=False)
```

Out[7]:
```
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 missing values in the dataset

In [8]:
```
# Replacing District Of Columbia by District of Columbia
Comcast_data.State.replace('District Of Columbia','District of Columbia',inplace=True)
```

2. Provide the trend chart for the number of complaints at monthly and daily granularity levels

In [9]:
```
# Converting Date, Date_month_year, Time into datetime datatype
Comcast_data.Date = pd.to_datetime(Comcast_data.Date)
Comcast_data.Date_month_year = pd.to_datetime(Comcast_data.Date_month_year)
Comcast_data.Time = pd.to_datetime(Comcast_data.Time)
```

In [10]:
```
Comcast_data.dtypes # Check datatypes
```

Out[10]:
```
Ticket #                             object
Customer Complaint                   object
Date                         datetime64[ns]
Date_month_year              datetime64[ns]
Time                         datetime64[ns]
Received Via                         object
City                                 object
State                                object
Zip code                              int64
Status                               object
Filing on Behalf of Someone          object
dtype: object
```

In [11]:
```
# Extracting Month Name, Day and Day name from Date column for analysis
```

```
Comcast_data['Month'] = pd.DatetimeIndex(Comcast_data.Date).month_name()
Comcast_data['Day'] = pd.DatetimeIndex(Comcast_data.Date).day
Comcast_data['Day_name'] = pd.DatetimeIndex(Comcast_data.Date).day_name()
```

In [12]:
```
Comcast_data.head() # first 5 records
```

Out[12]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day	Day_name
0	250635	Comcast Cable Internet Speeds	2015-04-22	2015-04-22	2021-06-23 15:53:50	Customer Care Call	Abingdon	Maryland	21009	Closed	No	April	22	Wednesday
1	223441	Payment disappear - service got disconnected	2015-04-08	2015-08-04	2021-06-23 10:22:56	Internet	Acworth	Georgia	30102	Closed	No	April	8	Wednesday
2	242732	Speed and Service	2015-04-18	2015-04-18	2021-06-23 09:55:47	Internet	Acworth	Georgia	30101	Closed	Yes	April	18	Saturday
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	2015-05-07	2015-07-05	2021-06-23 11:59:35	Internet	Acworth	Georgia	30101	Open	Yes	May	7	Thursday
4	307175	Comcast not working and no service to boot	2015-05-26	2015-05-26	2021-06-23 13:25:26	Internet	Acworth	Georgia	30101	Solved	No	May	26	Tuesday

In [13]:
```
# Creating data for Month-wise complaint
Monthly_Complaint = Comcast_data.groupby('Month').count().reset_index()
Monthly_Complaint
```

Out[13]:

	Month	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Day	Day_name
0	April	545	545	545	545	545	545	545	545	545	545	545	545	545
1	June	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
2	May	399	399	399	399	399	399	399	399	399	399	399	399	399

In [14]:
```
# Rearranging the data according to month name
Monthly_Complaint = Monthly_Complaint.reindex([0,2,1])
Monthly_Complaint
```

Out[14]:

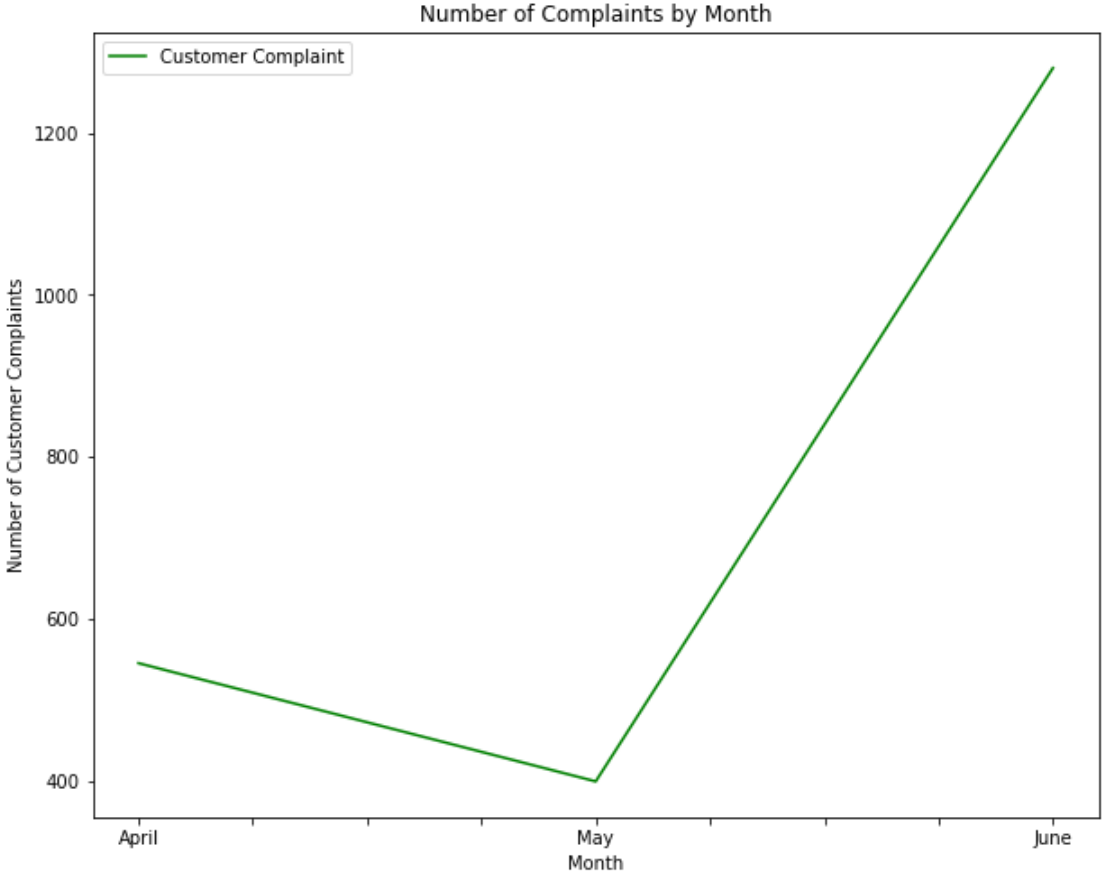
	Month	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Day	Day_name
0	April	545	545	545	545	545	545	545	545	545	545	545	545	545

	Month	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Day	Day_name
2	May	399	399	399	399	399	399	399	399	399	399	399	399	399
1	June	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280

In [15]:

```
# Lets create a trend chart for Monthly_Complaint
plt.figure(figsize=(10,8))
Monthly_Complaint.plot(x='Month',y='Customer Complaint',kind='line',color='green')
plt.xlabel('Month')
plt.ylabel('Number of Customer Complaints')
plt.title('Number of Complaints by Month')
plt.gcf().set_size_inches(10,8)
plt.show()
```

```
<Figure size 720x576 with 0 Axes>
```



From above analysis we found that the maximum number of complaints are in the month of June = 1280

In [16]:
```
# Creating data for day-wise complaint
Daily_Complaint = Comcast_data.groupby('Day').count().reset_index()
Daily_Complaint
```

Out[16]:

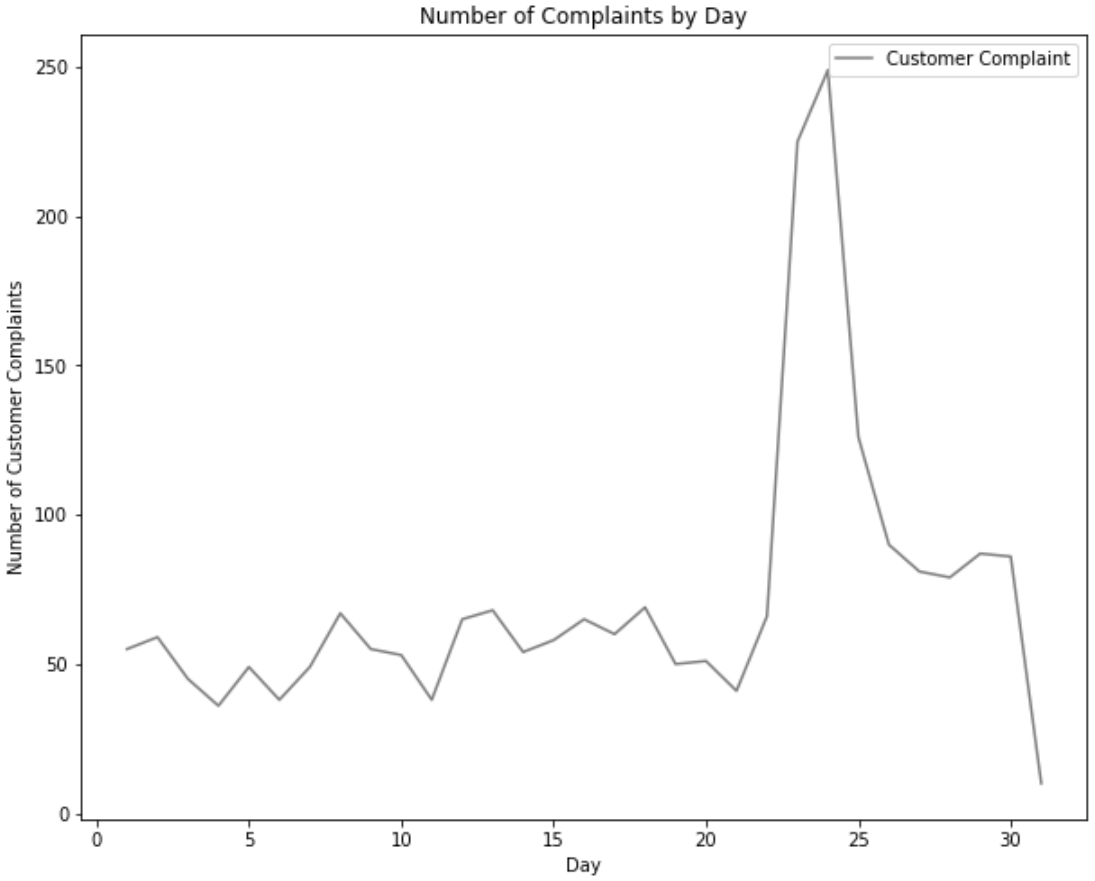
	Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day_name
0	1	55	55	55	55	55	55	55	55	55	55	55	55	55
1	2	59	59	59	59	59	59	59	59	59	59	59	59	59
2	3	45	45	45	45	45	45	45	45	45	45	45	45	45
3	4	36	36	36	36	36	36	36	36	36	36	36	36	36
4	5	49	49	49	49	49	49	49	49	49	49	49	49	49
5	6	38	38	38	38	38	38	38	38	38	38	38	38	38
6	7	49	49	49	49	49	49	49	49	49	49	49	49	49
7	8	67	67	67	67	67	67	67	67	67	67	67	67	67
8	9	55	55	55	55	55	55	55	55	55	55	55	55	55
9	10	53	53	53	53	53	53	53	53	53	53	53	53	53
10	11	38	38	38	38	38	38	38	38	38	38	38	38	38
11	12	65	65	65	65	65	65	65	65	65	65	65	65	65
12	13	68	68	68	68	68	68	68	68	68	68	68	68	68
13	14	54	54	54	54	54	54	54	54	54	54	54	54	54
14	15	58	58	58	58	58	58	58	58	58	58	58	58	58
15	16	65	65	65	65	65	65	65	65	65	65	65	65	65
16	17	60	60	60	60	60	60	60	60	60	60	60	60	60
17	18	69	69	69	69	69	69	69	69	69	69	69	69	69
18	19	50	50	50	50	50	50	50	50	50	50	50	50	50
19	20	51	51	51	51	51	51	51	51	51	51	51	51	51
20	21	41	41	41	41	41	41	41	41	41	41	41	41	41

	Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day_name
21	22	66	66	66	66	66	66	66	66	66	66	66	66	66
22	23	225	225	225	225	225	225	225	225	225	225	225	225	225
23	24	249	249	249	249	249	249	249	249	249	249	249	249	249
24	25	126	126	126	126	126	126	126	126	126	126	126	126	126
25	26	90	90	90	90	90	90	90	90	90	90	90	90	90
26	27	81	81	81	81	81	81	81	81	81	81	81	81	81
27	28	79	79	79	79	79	79	79	79	79	79	79	79	79
28	29	87	87	87	87	87	87	87	87	87	87	87	87	87
29	30	86	86	86	86	86	86	86	86	86	86	86	86	86
30	31	10	10	10	10	10	10	10	10	10	10	10	10	10

In [17]:

```
# Lets create a trend chart for Daily_Complaint
plt.figure(figsize=(10,8))
Daily_Complaint.plot(x='Day',y='Customer Complaint',kind='line',color='grey')
plt.xlabel('Day')
plt.ylabel('Number of Customer Complaints')
plt.title('Number of Complaints by Day')
plt.gcf().set_size_inches(10,8)
plt.show()
```

```
<Figure size 720x576 with 0 Axes>
```



From above analysis we found that the maximum complaints are in 24th day = 249

In [18]:
```
# Creating data for day-name-wise complaint
Dayname_Complaint = Comcast_data.groupby('Day_name').count().reset_index()
Dayname_Complaint
```

Out[18]:

	Day_name	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day
0	Friday	304	304	304	304	304	304	304	304	304	304	304	304	304
1	Monday	296	296	296	296	296	296	296	296	296	296	296	296	296
2	Saturday	194	194	194	194	194	194	194	194	194	194	194	194	194

	Day_name	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day
3	Sunday	138	138	138	138	138	138	138	138	138	138	138	138	138
4	Thursday	366	366	366	366	366	366	366	366	366	366	366	366	366
5	Tuesday	466	466	466	466	466	466	466	466	466	466	466	466	466
6	Wednesday	460	460	460	460	460	460	460	460	460	460	460	460	460

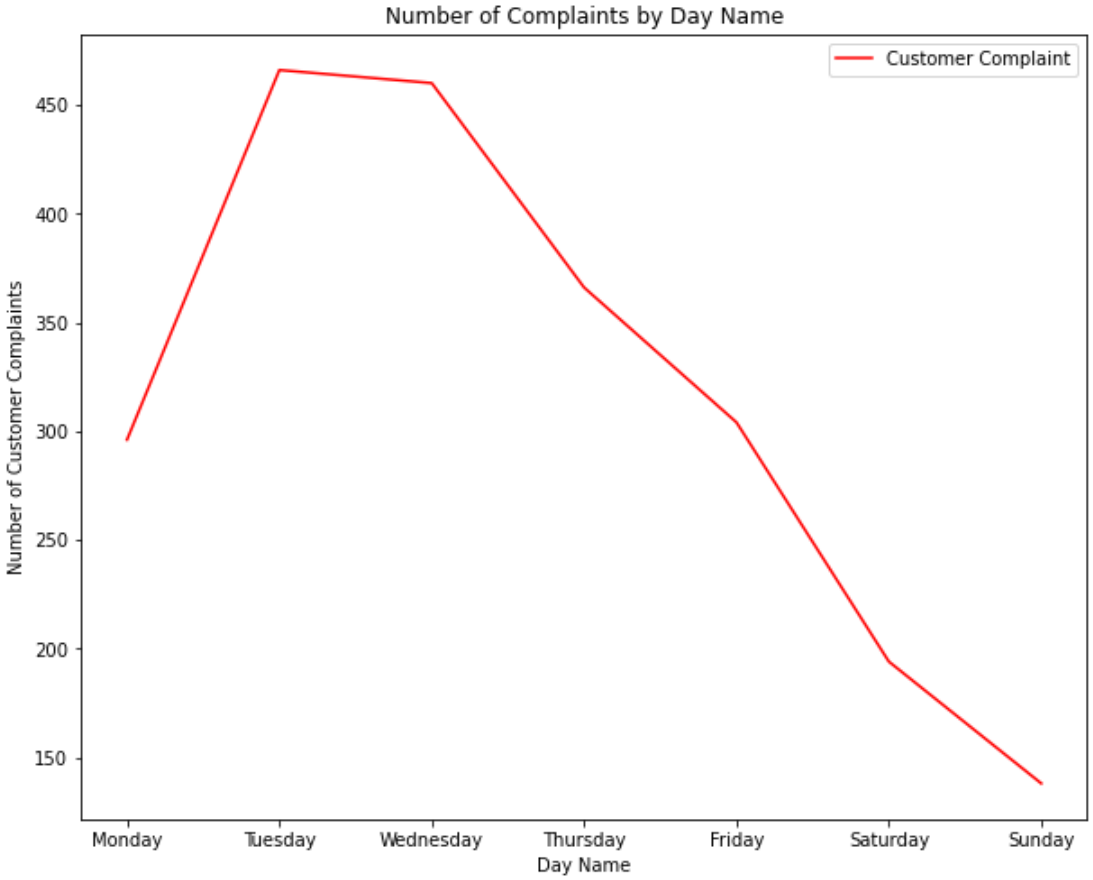
In [19]:
```
# Rearranging data according to Monday - Sunday
Dayname_Complaint = Dayname_Complaint.reindex([1,5,6,4,0,2,3])
Dayname_Complaint
```

Out[19]:

	Day_name	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day
1	Monday	296	296	296	296	296	296	296	296	296	296	296	296	296
5	Tuesday	466	466	466	466	466	466	466	466	466	466	466	466	466
6	Wednesday	460	460	460	460	460	460	460	460	460	460	460	460	460
4	Thursday	366	366	366	366	366	366	366	366	366	366	366	366	366
0	Friday	304	304	304	304	304	304	304	304	304	304	304	304	304
2	Saturday	194	194	194	194	194	194	194	194	194	194	194	194	194
3	Sunday	138	138	138	138	138	138	138	138	138	138	138	138	138

In [20]:
```
# Lets create a trend chart for Dayname_Complaint
plt.figure(figsize=(10,8))
Dayname_Complaint.plot(x='Day_name',y='Customer Complaint',kind='line',color='red')
plt.xlabel('Day Name')
plt.ylabel('Number of Customer Complaints')
plt.title('Number of Complaints by Day Name')
plt.gcf().set_size_inches(10,8)
plt.show()
```

```
<Figure size 720x576 with 0 Axes>
```



From above analysis we found that the maximum complaints are on Tuesday = 466

3. Provide a table with the frequency of complaint types

In [21]:
```
Complaint_type_frequency = Comcast_data['Customer Complaint'].value_counts()
Complaint_type_frequency
```

Out[21]:
```
Comcast                                    83
Comcast Internet                           18
Comcast Data Cap                           17
comcast                                    13
```

```
Data Caps                                          11
                                                   ..
Ridiculous and inconsistent billing                 1
Comcast and competition                             1
Comcast Rate Hike                                   1
Comcast Fraud?                                      1
Comcast (Xfinity) Monopolistic Billing Practices    1
Name: Customer Complaint, Length: 1841, dtype: int64
```

From above table we can see that maximum complaint are of Comcast = 83

4. Which complaint types are maximum i.e., around internet, network issues, or across any other domains

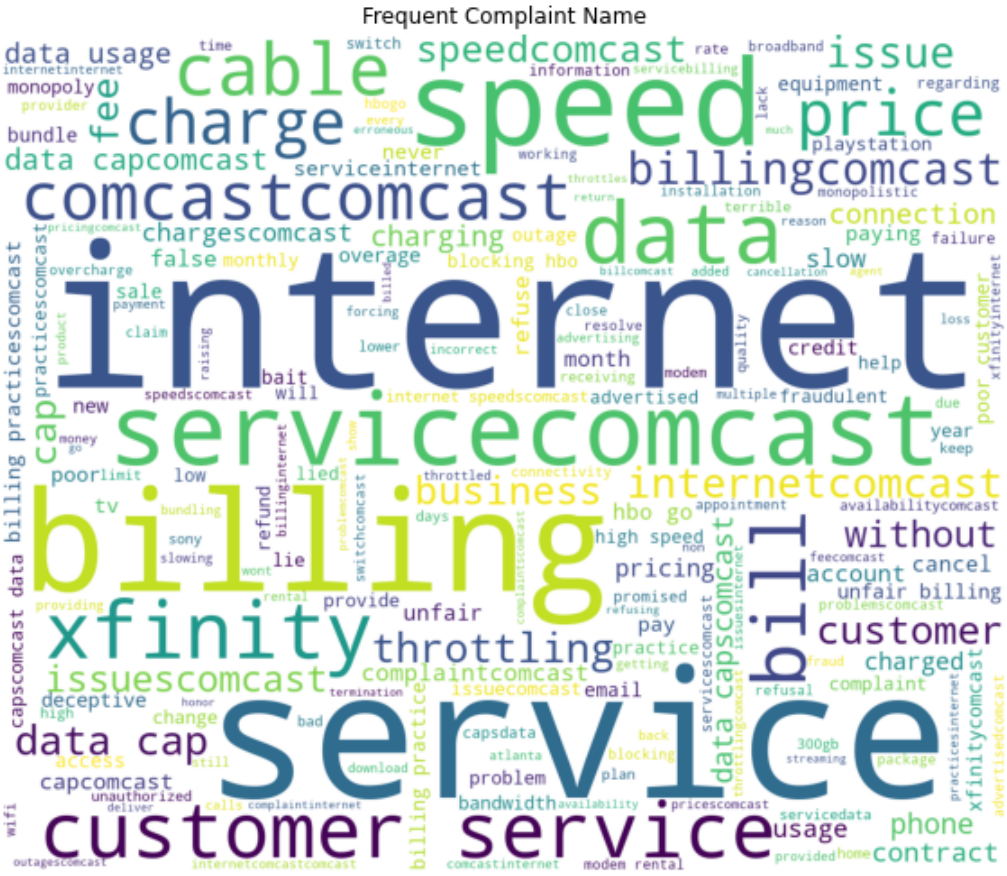
In [22]:
```
# importing required libraries
import nltk
from wordcloud import WordCloud, STOPWORDS
```

In [23]:
```
# Creating a new data for Complaint_Name
Complaint_Name = Comcast_data['Customer Complaint'].dropna().tolist()
Complaint_Name = ''.join(Complaint_Name).lower()
```

In [24]:
```
# making list of some stopwords
stop_word = ('Comcast','Now','Company','Day','Someone','Thing','Also','Got','Way','Call','Called','One','Said','Tell')
for word in stop_word:
    STOPWORDS.add(word)
```

In [25]:
```
# creating a wordcloud
wordcloud = WordCloud(stopwords=STOPWORDS,
                      background_color='white',
                      width=1200,
                      height=1000).generate(Complaint_Name)
```

In [26]:
```
# Creating a wordcloud of complaint names
plt.figure(figsize=(10,12) )
plt.imshow(wordcloud)
plt.title('Frequent Complaint Name')
plt.axis('off')
plt.show()
```



From above we can see that the complaint type internet is maximum

5. 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 [27]:
```
# Creating a new variable Current_Status with Open and Closed
Comcast_data['Current_Status'] = ['Open' if Status=='Open' or Status=='Pending' else 'Closed' for Status
                                  in Comcast_data['Status']]
Comcast_data.head() # first 5 records
```

Out[27]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Month	Day	Day_name	Current_Status
0	250635	Comcast Cable Internet Speeds	2015-04-22	2015-04-22	2021-06-23 15:53:50	Customer Care Call	Abingdon	Maryland	21009	Closed	No	April	22	Wednesday	Closed
1	223441	Payment disappear - service got disconnected	2015-04-08	2015-08-04	2021-06-23 10:22:56	Internet	Acworth	Georgia	30102	Closed	No	April	8	Wednesday	Closed
2	242732	Speed and Service	2015-04-18	2015-04-18	2021-06-23 09:55:47	Internet	Acworth	Georgia	30101	Closed	Yes	April	18	Saturday	Closed
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	2015-05-07	2015-07-05	2021-06-23 11:59:35	Internet	Acworth	Georgia	30101	Open	Yes	May	7	Thursday	Open
4	307175	Comcast not working and no service to boot	2015-05-26	2015-05-26	2021-06-23 13:25:26	Internet	Acworth	Georgia	30101	Solved	No	May	26	Tuesday	Closed

6. Provide state wise status of complaints in a stacked bar chart. Use the categorized variable from Q3.

In [28]:

```
# Creating a data for State wise complaints Status
State_Complaints_Status = Comcast_data.groupby(['State','Current_Status']).size().unstack().fillna(0)
State_Complaints_Status
```

Out[28]:

Current_Status	Closed	Open
State		
Alabama	17.0	9.0
Arizona	14.0	6.0
Arkansas	6.0	0.0
California	159.0	61.0
Colorado	58.0	22.0
Connecticut	9.0	3.0

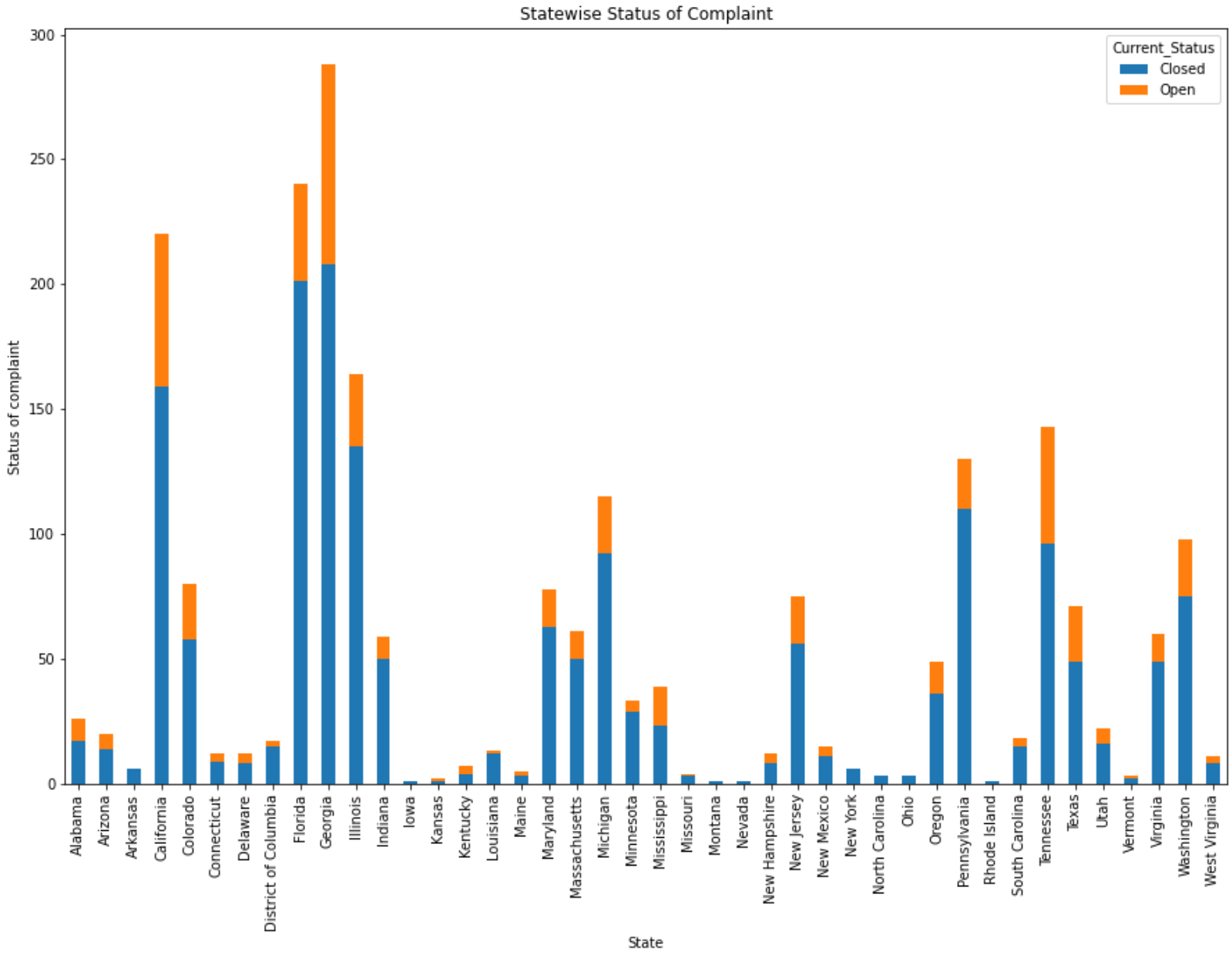
Current_Status	Closed	Open
State		
Delaware	8.0	4.0
District of Columbia	15.0	2.0
Florida	201.0	39.0
Georgia	208.0	80.0
Illinois	135.0	29.0
Indiana	50.0	9.0
Iowa	1.0	0.0
Kansas	1.0	1.0
Kentucky	4.0	3.0
Louisiana	12.0	1.0
Maine	3.0	2.0
Maryland	63.0	15.0
Massachusetts	50.0	11.0
Michigan	92.0	23.0
Minnesota	29.0	4.0
Mississippi	23.0	16.0
Missouri	3.0	1.0
Montana	1.0	0.0
Nevada	1.0	0.0
New Hampshire	8.0	4.0
New Jersey	56.0	19.0
New Mexico	11.0	4.0
New York	6.0	0.0
North Carolina	3.0	0.0
Ohio	3.0	0.0
Oregon	36.0	13.0

Current_Status	Closed	Open
State		
Pennsylvania	110.0	20.0
Rhode Island	1.0	0.0
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 [29]:

```
# Lets create a stacked bar chart for State_Complaints_Status
plt.figure(figsize=(15,10))
State_Complaints_Status.plot(kind='bar',stacked=True)
plt.xlabel('State')
plt.ylabel('Status of complaint')
plt.title('Statewise Status of Complaint')
plt.gcf().set_size_inches(15,10)
plt.show()
```

```
<Figure size 1080x720 with 0 Axes>
```



7. Which state has the maximum complaints

In [30]:

```
# Creating a data for Statewise number of complaints
Statewise_Complaints = Comcast_data.groupby('State').size().sort_values(ascending=False)
Statewise_Complaints
```

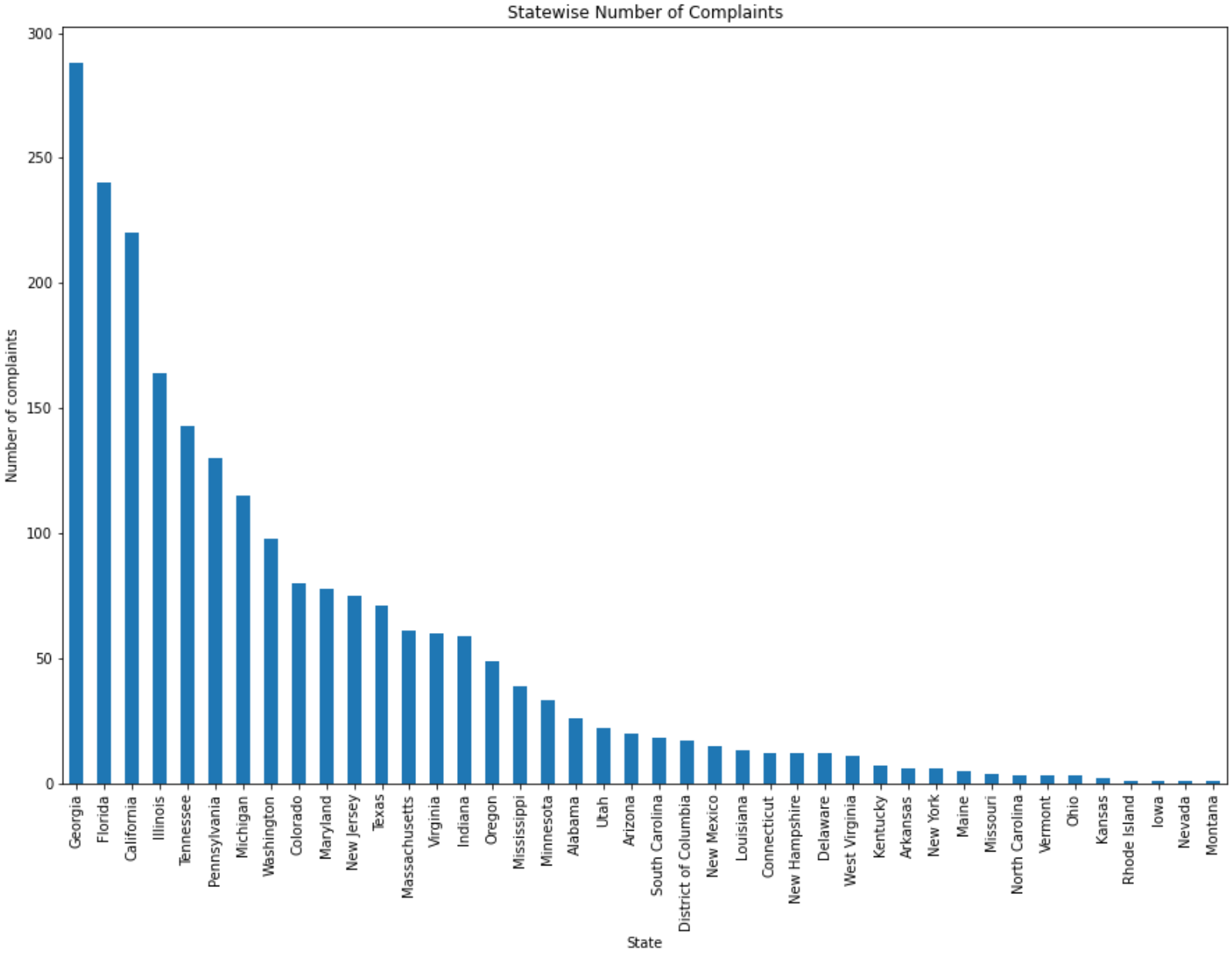
Out[30]:

```
State
Georgia                 288
Florida                 240
California              220
Illinois                164
Tennessee               143
Pennsylvania            130
Michigan                115
Washington               98
Colorado                 80
Maryland                 78
New Jersey               75
Texas                    71
Massachusetts            61
Virginia                 60
Indiana                  59
Oregon                   49
Mississippi              39
Minnesota                33
Alabama                  26
Utah                     22
Arizona                  20
South Carolina           18
District of Columbia     17
New Mexico               15
Louisiana                13
Connecticut              12
New Hampshire            12
Delaware                 12
West Virginia            11
Kentucky                  7
Arkansas                  6
New York                  6
Maine                     5
Missouri                  4
North Carolina            3
Vermont                   3
Ohio                      3
Kansas                    2
Rhode Island              1
Iowa                      1
Nevada                    1
Montana                   1
dtype: int64
```

In [31]:

```
# Lets create a bar chart for Statewise number of complaints
plt.figure(figsize=(15,10))
```

```
Statewise_Complaints.plot(kind='bar')
plt.xlabel('State')
plt.ylabel('Number of complaints')
plt.title('Statewise Number of Complaints')
plt.gcf().set_size_inches(15,10)
plt.show()
```



From above analysis we found that the state Georgia has maximum number of complaints = 288

8. Which state has the highest percentage of unresolved complaints

In [32]:
```
# Creating a new column for %_Unresolved_Complaints and %_Resolved_Complaints
State_Complaints_Status['%_Unresolved_Complaints'] = State_Complaints_Status['Open']/State_Complaints_Status['Open'].sum()*100
State_Complaints_Status['%_Resolved_Complaints'] = State_Complaints_Status['Closed']/State_Complaints_Status['Closed'].sum()*100
State_Complaints_Status
```

Out[32]:

Current_Status State	Closed	Open	%_Unresolved_Complaints	%_Resolved_Complaints
Alabama	17.0	9.0	1.740812	0.995899
Arizona	14.0	6.0	1.160542	0.820152
Arkansas	6.0	0.0	0.000000	0.351494
California	159.0	61.0	11.798839	9.314587
Colorado	58.0	22.0	4.255319	3.397774
Connecticut	9.0	3.0	0.580271	0.527241
Delaware	8.0	4.0	0.773694	0.468658
District of Columbia	15.0	2.0	0.386847	0.878735
Florida	201.0	39.0	7.543520	11.775044
Georgia	208.0	80.0	15.473888	12.185120
Illinois	135.0	29.0	5.609284	7.908612
Indiana	50.0	9.0	1.740812	2.929115
Iowa	1.0	0.0	0.000000	0.058582
Kansas	1.0	1.0	0.193424	0.058582
Kentucky	4.0	3.0	0.580271	0.234329
Louisiana	12.0	1.0	0.193424	0.702988
Maine	3.0	2.0	0.386847	0.175747
Maryland	63.0	15.0	2.901354	3.690685
Massachusetts	50.0	11.0	2.127660	2.929115
Michigan	92.0	23.0	4.448743	5.389572
Minnesota	29.0	4.0	0.773694	1.698887

Current_Status State	Closed	Open	%_Unresolved_Complaints	%_Resolved_Complaints
Mississippi	23.0	16.0	3.094778	1.347393
Missouri	3.0	1.0	0.193424	0.175747
Montana	1.0	0.0	0.000000	0.058582
Nevada	1.0	0.0	0.000000	0.058582
New Hampshire	8.0	4.0	0.773694	0.468658
New Jersey	56.0	19.0	3.675048	3.280609
New Mexico	11.0	4.0	0.773694	0.644405
New York	6.0	0.0	0.000000	0.351494
North Carolina	3.0	0.0	0.000000	0.175747
Ohio	3.0	0.0	0.000000	0.175747
Oregon	36.0	13.0	2.514507	2.108963
Pennsylvania	110.0	20.0	3.868472	6.444054
Rhode Island	1.0	0.0	0.000000	0.058582
South Carolina	15.0	3.0	0.580271	0.878735
Tennessee	96.0	47.0	9.090909	5.623902
Texas	49.0	22.0	4.255319	2.870533
Utah	16.0	6.0	1.160542	0.937317
Vermont	2.0	1.0	0.193424	0.117165
Virginia	49.0	11.0	2.127660	2.870533
Washington	75.0	23.0	4.448743	4.393673
West Virginia	8.0	3.0	0.580271	0.468658

In [33]:
```
# Sorting the data in descending order according to %_Unresolved_Complaints
State_Complaints_Status.sort_values(ascending=False,by='%_Unresolved_Complaints')
```

Out[33]:

Current_Status State	Closed	Open	%_Unresolved_Complaints	%_Resolved_Complaints

Current_Status State	Closed	Open	%_Unresolved_Complaints	%_Resolved_Complaints
Georgia	208.0	80.0	15.473888	12.185120
California	159.0	61.0	11.798839	9.314587
Tennessee	96.0	47.0	9.090909	5.623902
Florida	201.0	39.0	7.543520	11.775044
Illinois	135.0	29.0	5.609284	7.908612
Washington	75.0	23.0	4.448743	4.393673
Michigan	92.0	23.0	4.448743	5.389572
Colorado	58.0	22.0	4.255319	3.397774
Texas	49.0	22.0	4.255319	2.870533
Pennsylvania	110.0	20.0	3.868472	6.444054
New Jersey	56.0	19.0	3.675048	3.280609
Mississippi	23.0	16.0	3.094778	1.347393
Maryland	63.0	15.0	2.901354	3.690685
Oregon	36.0	13.0	2.514507	2.108963
Virginia	49.0	11.0	2.127660	2.870533
Massachusetts	50.0	11.0	2.127660	2.929115
Alabama	17.0	9.0	1.740812	0.995899
Indiana	50.0	9.0	1.740812	2.929115
Arizona	14.0	6.0	1.160542	0.820152
Utah	16.0	6.0	1.160542	0.937317
Minnesota	29.0	4.0	0.773694	1.698887
Delaware	8.0	4.0	0.773694	0.468658
New Hampshire	8.0	4.0	0.773694	0.468658
New Mexico	11.0	4.0	0.773694	0.644405
West Virginia	8.0	3.0	0.580271	0.468658
Kentucky	4.0	3.0	0.580271	0.234329

Current_Status State	Closed	Open	%_Unresolved_Complaints	%_Resolved_Complaints
Connecticut	9.0	3.0	0.580271	0.527241
South Carolina	15.0	3.0	0.580271	0.878735
District of Columbia	15.0	2.0	0.386847	0.878735
Maine	3.0	2.0	0.386847	0.175747
Louisiana	12.0	1.0	0.193424	0.702988
Kansas	1.0	1.0	0.193424	0.058582
Vermont	2.0	1.0	0.193424	0.117165
Missouri	3.0	1.0	0.193424	0.175747
Ohio	3.0	0.0	0.000000	0.175747
Iowa	1.0	0.0	0.000000	0.058582
Rhode Island	1.0	0.0	0.000000	0.058582
New York	6.0	0.0	0.000000	0.351494
Nevada	1.0	0.0	0.000000	0.058582
Montana	1.0	0.0	0.000000	0.058582
Arkansas	6.0	0.0	0.000000	0.351494
North Carolina	3.0	0.0	0.000000	0.175747

From above analysis we found that the state Georgia has highest percentage of unresolved complaints = 15.47%

9. Provide the percentage of complaints resolved till date, which were received through the Internet and customer care calls

In [34]:
```
# Creating a data for complaints and grouping it by Received Via and Current_Status
Complaint_Status = Comcast_data.groupby(['Received Via','Current_Status']).size().unstack().fillna(0)
Complaint_Status
```

Out[34]:

Current_Status	Closed	Open
Received Via		
Customer Care Call	864	255
Internet	843	262

In [35]:

```
# Creating a new column %_Resolved which gives % of complaints resolved
Complaint_Status['%_Resolved'] = Complaint_Status['Closed'] / Complaint_Status['Closed'].sum()*100
Complaint_Status
```

Out[35]:

Current_Status	Closed	Open	%_Resolved
Received Via			
Customer Care Call	864	255	50.615114
Internet	843	262	49.384886

From above table we can see that the percentage of complaints resolved through the Internet and customer care calls is 50.61% and 49.38% respectively

Summary :

1. The maximum number of complaints are in the month of June = 1280

2. The maximum complaints are on 24th day = 249

3. The maximum complaints are on Tuesday = 466

4. The maximum complaint are of Comcast = 83

5. The complaint type internet is maximum

6. We created a new categorical variable Current_Status with value as Open and Closed.

7. We provided state wise status of complaints in a stacked bar chart

8. The state Georgia has maximum number of complaints = 288

9. The state Georgia has highest percentage of unresolved complaints = 15.47%

10. The percentage of complaints resolved through the Internet and customer care calls is 50.61% and 49.38% respectively