Comcast Telecom Consumer Complaints Analysis

Introduction

Comcast is an American global telecommunication company. The firm has been providing terrible customer service. They continue to fall short despite repeated promises to improve.

In 2004 and 2007, the American Customer Satisfaction Index (ACSI) survey found that Comcast had the worst customer satisfaction rating of any company or government agency in the country, including the Internal Revenue Service. The ACSI indicates that almost half of all cable customers (regardless of company) have registered complaints, and that cable is the only industry to score below 60 in the ACSI. Comcast's Customer Service Rating by the ACSI surveys indicate that the company's customer service has not improved since the surveys began in 2001. Analysis of the surveys states that "Comcast is one of the lowest scoring companies in ACSI. As its customer satisfaction eroded by 7% , over the past year, revenue increased by 12%. The ACSI analysis also addresses this contradiction, stating that "Such pricing power usually comes with some level of monopoly protection and most cable companies have little competition at the local level. This also means that a cable company can do well financially even though its customers are not particularly satisfied."

In April 2014, Comcast was awarded the 2014 "Worst Company in America" award; an annual contest by the consumer affairs blog The Consumerist that runs a series of reader polls to determine the least popular company in America. This was the second time Comcast had been awarded this title, the first being in 2010.

On August 1, 2016, Washington State Attorney General Bob Ferguson filed a lawsuit against Comcast Corporation in King County Superior Court, alleging the company's own documents reveal a pattern of illegally deceiving their customers to pad their bottom line by tens of millions of dollars. The FCC issued a $2.3 million fine to Comcast after finding that the company was charging customers for unordered services and equipment. More than a 1000 customers issued complaints about these unprecedented charges to their bill. In addition, numerous customers reported inappropriate name-calling and interrogation by customer service representatives. Comcast's executive vice president, David Cohen, admitted the company needed to improve their customer service.

The existing database will serve as a repository of public customer complaints filed against Comcast.It will help to pin down what is wrong with Comcast's customer service.

Data Overview

Field	Description
Ticket #	Ticket number assigned to each complaint

Customer Complaint	Description of complaint
Date	Date of complaint
Time	Time of complaint
Received Via	Mode of communication of the complaint
City	Customer city
State	Customer state
Zipcode	Customer zip
Status	Status of complaint
Filing on behalf of someone	Yes/No complaint filed on behalf of someone

Import the required libraries and the database

Let us now import the required libraries and dataset to do analysis

In [1]:
```
#import the libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import datetime
from matplotlib import animation
import re
import string
from nltk.corpus import stopwords
from nltk import FreqDist
from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator
from PIL import Image
import folium
%matplotlib inline
```

In [2]:
```
#import the dataset
complaints = pd.read_csv("C:/Users/ruben/OneDrive/Documents/Python_DS/Datasets/Comcast_telecom_complaints_data.cs
complaints.head(20)
```

Out[2]:

	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
5	338519	ISP Charging for arbitrary data limits with ov...	06-12-15	06-Dec-15	9:59:40 PM	Internet	Acworth	Georgia	30101	Solved	No
6	361148	Throttling service and unreasonable data caps	24-06-15	24-Jun-15	10:13:55 AM	Customer Care Call	Acworth	Georgia	30101	Pending	No
7	359792	Comcast refuses to help troubleshoot and corre...	23-06-15	23-Jun-15	6:56:14 PM	Internet	Adrian	Michigan	49221	Solved	No
8	318072	Comcast extended outages	06-01-15	06-Jan-15	11:46:30 PM	Customer Care Call	Alameda	California	94502	Closed	No
9	371214	Comcast Raising Prices and Not Being Available...	28-06-15	28-Jun-15	6:46:31 PM	Customer Care Call	Alameda	California	94501	Open	Yes
10	255938	Billing after service was asked to be disconne...	24-04-15	24-Apr-15	4:40:36 PM	Internet	Albuquerque	New Mexico	87106	Closed	No
11	276409	YAHOO FAILURE TO RESTORE EMAIL SEARCH FEATURE	05-06-15	05-Jun-15	3:09:49 PM	Customer Care Call	Albuquerque	New Mexico	87109	Closed	No

12	339282	Comcast Violating Open Internet Rules by Block...	13-06-15	13-Jun-15	4:03:18 PM	Internet	Albuquerque	New Mexico	87105	Open	Yes
13	360178	Internet speed	23-06-15	23-Jun-15	9:23:23 PM	Internet	Albuquerque	New Mexico	87113	Solved	No
14	376268	Internet Disconnects Every Night	30-06-15	30-Jun-15	10:30:02 PM	Customer Care Call	Albuquerque	New Mexico	87116	Solved	No
15	370137	Internet complaint	27-06-15	27-Jun-15	3:25:03 PM	Customer Care Call	Albuquerqur	New Mexico	87102	Pending	No
16	363695	Internet Availability and Speed	24-06-15	24-Jun-15	11:47:33 PM	Customer Care Call	Alexandria	Indiana	46001	Solved	No
17	238694	Comcast owes me $65 and claims I need to retur...	16-04-15	16-Apr-15	10:04:57 AM	Internet	Alexandria	Virginia	22304	Closed	No
18	230876	Horrible Internet Service	04-11-15	04-Nov-15	7:48:05 PM	Customer Care Call	Alexandria	Virginia	22305	Closed	No
19	318725	Failure to provide services that I am billed for.	06-02-15	06-Feb-15	1:03:52 PM	Customer Care Call	Alexandria	Virginia	22314	Closed	No

Exploratory Data Analysis (EDA)

Let us now perform some EDA with the help of descriptive stats and data visualization to extract hidden information from the data and to infer whats wrong with the company.

In [3]:
```
#Checking the structure of data
complaints.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2224 entries, 0 to 2223
Data columns (total 11 columns):
 #   Column                      Non-Null Count  Dtype 
---  ------                      --------------  ----- 
 0   Ticket #                    2224 non-null   object
 1   Customer Complaint          2224 non-null   object
 2   Date                        2224 non-null   object
 3   Date_month_year             2224 non-null   object
 4   Time                        2224 non-null   object
 5   Received Via                2224 non-null   object
 6   City                        2224 non-null   object
 7   State                       2224 non-null   object
 8   Zip code                    2224 non-null   int64 
 9   Status                      2224 non-null   object
 10  Filing on Behalf of Someone  2224 non-null   object
dtypes: int64(1), object(10)
memory usage: 191.2+ KB
```

In [4]:
```
#checking the number of null values for each feature
complaints.isna().sum()
```

Out[4]:
```
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
```

Fortunately, there are no missing values in the dataset which is good and we can proceed with the analysis

In [5]:
```
complaints.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 2224 entries, 0 to 2223
Data columns (total 11 columns):
 #   Column                       Non-Null Count  Dtype 
---  ------                       --------------  ----- 
 0   Ticket #                     2224 non-null   object
 1   Customer Complaint           2224 non-null   object
 2   Date                         2224 non-null   object
 3   Date_month_year              2224 non-null   object
 4   Time                         2224 non-null   object
 5   Received Via                 2224 non-null   object
 6   City                         2224 non-null   object
 7   State                        2224 non-null   object
 8   Zip code                     2224 non-null   int64 
 9   Status                       2224 non-null   object
 10  Filing on Behalf of Someone  2224 non-null   object
dtypes: int64(1), object(10)
memory usage: 191.2+ KB
```

In [6]:
```
def merger(cols):
    date = cols[0]
    time = cols[1]
    x = ' '.join([date,time])
    return x
```

In [7]:
```
complaints['Timestamp'] = complaints[['Date','Time']].apply(merger,axis=1)
```

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

Out[8]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	22-04-15 3:53:50 PM
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	04-08-15 10:22:56 AM
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	18-04-15 9:55:47 AM
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	05-07-15 11:59:35 AM
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	26-05-15 1:25:26 PM

In [9]:
```
complaints['Timestamp'] = pd.to_datetime(complaints['Timestamp'],format = '%d-%m-%y %I:%M:%S %p')
```

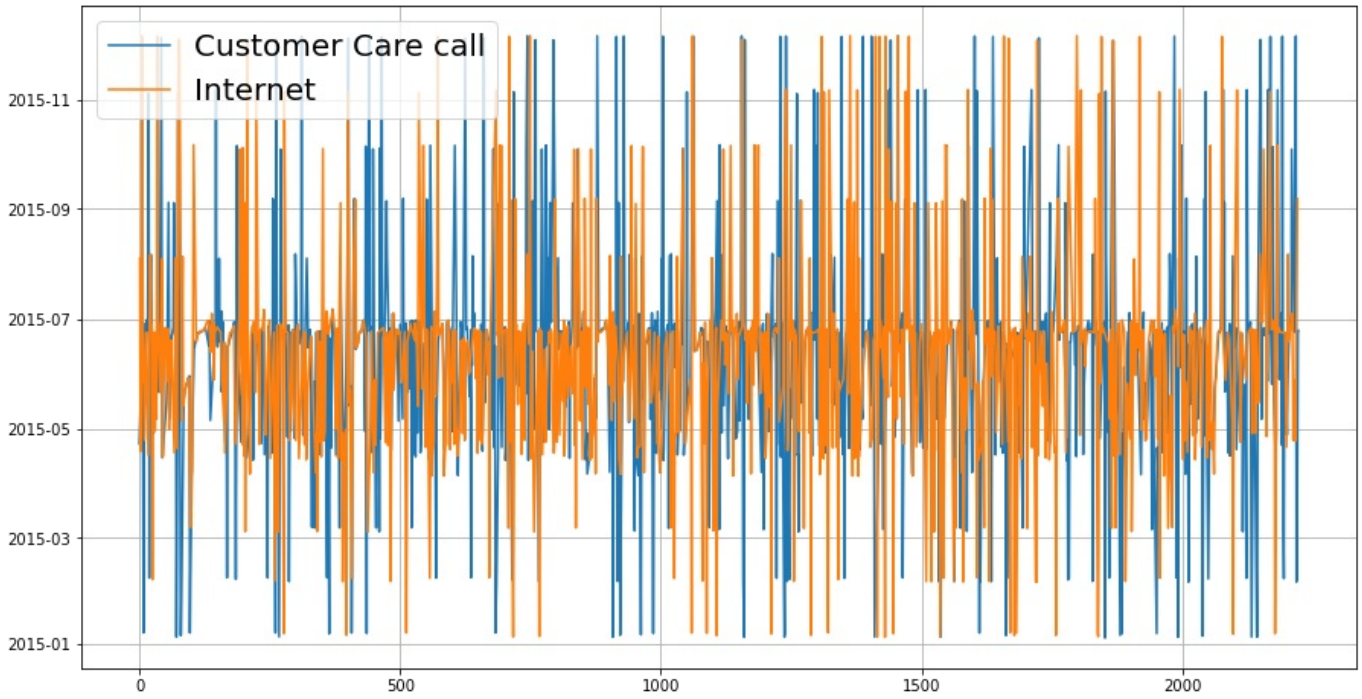
In [10]:
```
complaints.describe()
```

Out[10]:

	Zip code
count	2224.000000
mean	47994.393435
std	28885.279427
min	1075.000000
25%	30056.500000
50%	37211.000000
75%	77058.750000
max	99223.000000

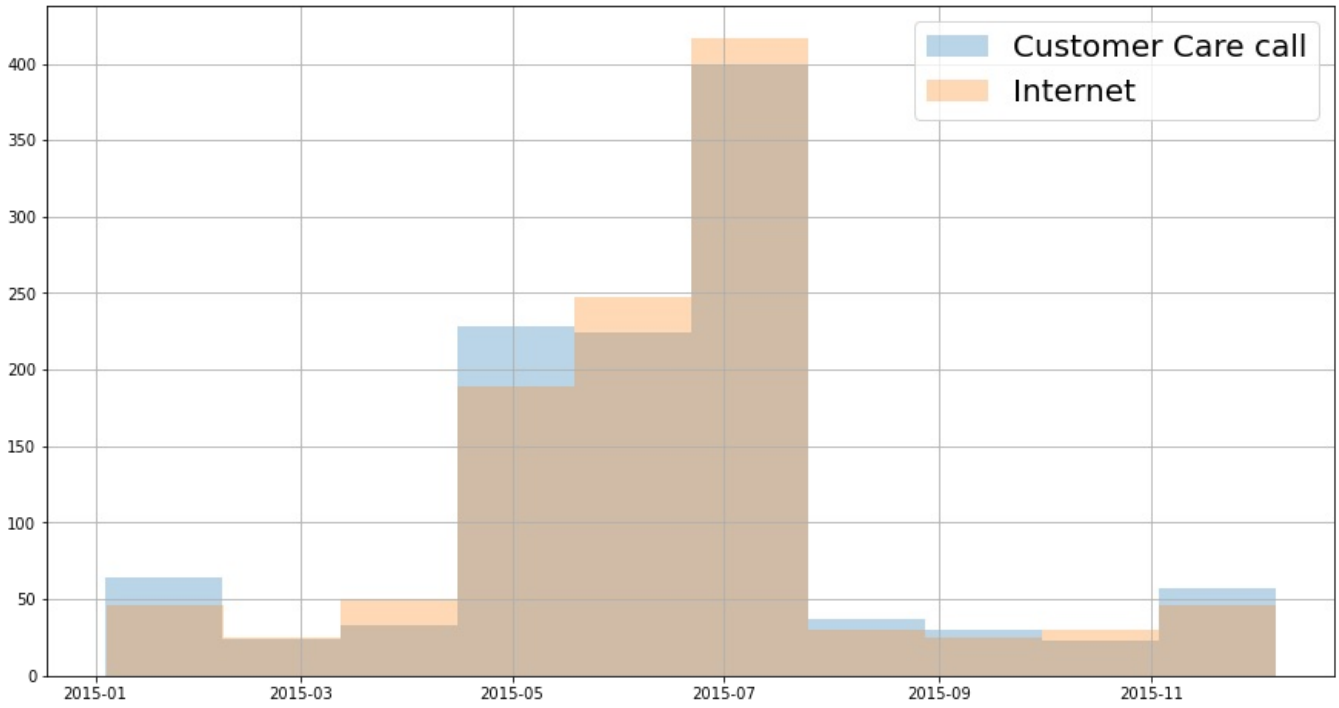
In [11]:
```
plt.figure(figsize=(15,8))
plt.plot(complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'], label='Customer Care call')
plt.plot(complaints[complaints['Received Via']=='Internet']['Timestamp'], label='Internet')
plt.legend(fontsize=20)
#plt.xticks(ticks = complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'], labels=list(range(
#plt.xlim(complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'])
```

```
plt.grid(True)
plt.show()
```



In [12]:

```
plt.figure(figsize=(15,8))
plt.hist(complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'], label='Customer Care call',al
plt.hist(complaints[complaints['Received Via']=='Internet']['Timestamp'], label='Internet',alpha = 0.3)
plt.legend(fontsize=20)
#plt.xticks(ticks = complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'], labels=list(range(
#plt.xlim(complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'])
plt.grid(True)
plt.show()
```



In [13]:

```
complaints['Day']=complaints['Timestamp'].apply(lambda d:d.day)
complaints['Month'] = complaints['Timestamp'].apply(lambda d: d.month)
complaints['Year'] = complaints['Timestamp'].apply(lambda d: d.year)
```

In [14]:

```
complaints.head(30)
```

Out[14]:

Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Day

0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	2015-04-22 15:53:50	22
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	2015-08-04 10:22:56	4
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	2015-04-18 09:55:47	18
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	2015-07-05 11:59:35	5
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	2015-05-26 13:25:26	26
5	338519	ISP Charging for arbitrary data limits with ov...	06-12-15	06-Dec-15	9:59:40 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-12-06 21:59:40	6
6	361148	Throttling service and unreasonable data caps	24-06-15	24-Jun-15	10:13:55 AM	Customer Care Call	Acworth	Georgia	30101	Pending	No	2015-06-24 10:13:55	24
7	359792	Comcast refuses to help troubleshoot and corre...	23-06-15	23-Jun-15	6:56:14 PM	Internet	Adrian	Michigan	49221	Solved	No	2015-06-23 18:56:14	23
8	318072	Comcast extended outages	06-01-15	06-Jan-15	11:46:30 PM	Customer Care Call	Alameda	California	94502	Closed	No	2015-01-06 23:46:30	6
9	371214	Comcast Raising Prices and Not Being Available...	28-06-15	28-Jun-15	6:46:31 PM	Customer Care Call	Alameda	California	94501	Open	Yes	2015-06-28 18:46:31	28
10	255938	Billing after service was asked to be disconne...	24-04-15	24-Apr-15	4:40:36 PM	Internet	Albuquerque	New Mexico	87106	Closed	No	2015-04-24 16:40:36	24
11	276409	YAHOO FAILURE TO RESTORE EMAIL SEARCH FEATURE	05-06-15	05-Jun-15	3:09:49 PM	Customer Care Call	Albuquerque	New Mexico	87109	Closed	No	2015-06-05 15:09:49	5
12	339282	Comcast Violating Open Internet Rules by Block...	13-06-15	13-Jun-15	4:03:18 PM	Internet	Albuquerque	New Mexico	87105	Open	Yes	2015-06-13 16:03:18	13
13	360178	Internet speed	23-06-15	23-Jun-15	9:23:23 PM	Internet	Albuquerque	New Mexico	87113	Solved	No	2015-06-23 21:23:23	23
14	376268	Internet Disconnects Every Night	30-06-15	30-Jun-15	10:30:02 PM	Customer Care Call	Albuquerque	New Mexico	87116	Solved	No	2015-06-30 22:30:02	30
15	370137	Internet complaint	27-06-15	27-Jun-15	3:25:03 PM	Customer Care Call	Albuquerqur	New Mexico	87102	Pending	No	2015-06-27 15:25:03	27
16	363695	Internet Availability and Speed	24-06-15	24-Jun-15	11:47:33 PM	Customer Care Call	Alexandria	Indiana	46001	Solved	No	2015-06-24 23:47:33	24
17	238694	Comcast owes me $65 and claims I need to retur...	16-04-15	16-Apr-15	10:04:57 AM	Internet	Alexandria	Virginia	22304	Closed	No	2015-04-16 10:04:57	16
18	230876	Horrible Internet Service	04-11-15	04-Nov-15	7:48:05 PM	Customer Care Call	Alexandria	Virginia	22305	Closed	No	2015-11-04 19:48:05	4
19	318725	Failure to provide services that I am billed for.	06-02-15	06-Feb-15	1:03:52 PM	Customer Care Call	Alexandria	Virginia	22314	Closed	No	2015-02-06 13:03:52	6
20	327657	Internet out all the time but they have a mono...	06-07-15	06-Jul-15	8:55:43 PM	Customer Care Call	Alexandria	Virginia	22305	Solved	No	2015-07-06 20:55:43	6
		horrible cable service and	06-08-		3:18:58							2015-08-06	

21	328742	customer service	15	06-Aug-15	PM	Internet	Alexandria	Virginia	22312	Solved	No	15:18:58	6
22	328165	Speed	06-08-15	06-Aug-15	12:03:37 PM	Customer Care Call	Alexandria	Virginia	22304	Solved	No	2015-08-06 12:03:37	6
23	370538	Comcast monopoly bundling practices	27-06-15	27-Jun-15	9:04:34 PM	Internet	Alexandria	Virginia	22304	Open	No	2015-06-27 21:04:34	27
24	370363	COMCAST!	27-06-15	27-Jun-15	6:37:29 PM	Internet	Alexandria	Virginia	22305	Solved	No	2015-06-27 18:37:29	27
25	270163	bait and switch	05-02-15	05-Feb-15	3:55:24 PM	Internet	Algonquin	Illinois	60102	Open	Yes	2015-02-05 15:55:24	5
26	355976	Comcast Customer Service	22-06-15	22-Jun-15	2:10:39 PM	Internet	Aliquippa	Pennsylvania	15001	Open	No	2015-06-22 14:10:39	22
27	260651	Apartment Management's Exclusivity Contract wi...	28-04-15	28-Apr-15	8:01:46 AM	Customer Care Call	Allston	Massachusetts	2134	Closed	No	2015-04-28 08:01:46	28
28	305340	Unable to reach a Comcast agent for internet a...	24-05-15	24-May-15	2:57:47 PM	Customer Care Call	Aloha	Oregon	97006	Solved	No	2015-05-24 14:57:47	24
29	360759	Wifi internet not working as well	24-06-15	24-Jun-15	2:23:23 AM	Internet	Aloha	Oregon	97006	Pending	No	2015-06-24 02:23:23	24

In [15]:
```
complaints['Year'].value_counts()
```

Out[15]:
```
2015    2224
Name: Year, dtype: int64
```

In [16]:
```
complaints[complaints['Received Via']=='Customer Care Call'].groupby('Day').count()
```

Out[16]:

Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Month	Year
4	112	112	112	112	112	112	112	112	112	112	112	112	112	112
5	73	73	73	73	73	73	73	73	73	73	73	73	73	73
6	144	144	144	144	144	144	144	144	144	144	144	144	144	144
13	26	26	26	26	26	26	26	26	26	26	26	26	26	26
14	28	28	28	28	28	28	28	28	28	28	28	28	28	28
15	29	29	29	29	29	29	29	29	29	29	29	29	29	29
16	40	40	40	40	40	40	40	40	40	40	40	40	40	40
17	33	33	33	33	33	33	33	33	33	33	33	33	33	33
18	35	35	35	35	35	35	35	35	35	35	35	35	35	35
19	16	16	16	16	16	16	16	16	16	16	16	16	16	16
20	28	28	28	28	28	28	28	28	28	28	28	28	28	28
21	14	14	14	14	14	14	14	14	14	14	14	14	14	14
22	35	35	35	35	35	35	35	35	35	35	35	35	35	35
23	113	113	113	113	113	113	113	113	113	113	113	113	113	113
24	122	122	122	122	122	122	122	122	122	122	122	122	122	122
25	55	55	55	55	55	55	55	55	55	55	55	55	55	55
26	41	41	41	41	41	41	41	41	41	41	41	41	41	41
27	42	42	42	42	42	42	42	42	42	42	42	42	42	42
28	43	43	43	43	43	43	43	43	43	43	43	43	43	43
29	47	47	47	47	47	47	47	47	47	47	47	47	47	47
30	37	37	37	37	37	37	37	37	37	37	37	37	37	37
31	6	6	6	6	6	6	6	6	6	6	6	6	6	6

In [17]:
```
complaints[complaints['Received Via']=='Customer Care Call'].groupby('Month').count()
```

Out[17]:

Month	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Day	Year
1	32	32	32	32	32	32	32	32	32	32	32	32	32	32
2	36	36	36	36	36	36	36	36	36	36	36	36	36	36
3	20	20	20	20	20	20	20	20	20	20	20	20	20	20
4	188	188	188	188	188	188	188	188	188	188	188	188	188	188
5	156	156	156	156	156	156	156	156	156	156	156	156	156	156
6	515	515	515	515	515	515	515	515	515	515	515	515	515	515
7	25	25	25	25	25	25	25	25	25	25	25	25	25	25
8	37	37	37	37	37	37	37	37	37	37	37	37	37	37
9	30	30	30	30	30	30	30	30	30	30	30	30	30	30
10	23	23	23	23	23	23	23	23	23	23	23	23	23	23
11	20	20	20	20	20	20	20	20	20	20	20	20	20	20
12	37	37	37	37	37	37	37	37	37	37	37	37	37	37

In [18]:
```
complaints[complaints['Received Via']=='Customer Care Call'].groupby(['Month','Day']).count().describe()
```

Out[18]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing Behalf Someo
count	91.000000	91.000000	91.000000	91.000000	91.000000	91.000000	91.000000	91.000000	91.000000	91.000000	91.0000
mean	12.296703	12.296703	12.296703	12.296703	12.296703	12.296703	12.296703	12.296703	12.296703	12.296703	12.2967
std	14.924621	14.924621	14.924621	14.924621	14.924621	14.924621	14.924621	14.924621	14.924621	14.924621	14.9246
min	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.000000	2.0000
25%	5.500000	5.500000	5.500000	5.500000	5.500000	5.500000	5.500000	5.500000	5.500000	5.500000	5.5000
50%	9.000000	9.000000	9.000000	9.000000	9.000000	9.000000	9.000000	9.000000	9.000000	9.000000	9.0000
75%	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000	13.0000
max	107.000000	107.000000	107.000000	107.000000	107.000000	107.000000	107.000000	107.000000	107.000000	107.000000	107.0000

In [19]:
```
#Determining the day with the max no. of complaints
df_counts_cust = complaints[complaints['Received Via']=='Customer Care Call'].groupby(['Month','Day']).count()
df_counts_cust[df_counts_cust['Customer Complaint']==107]
```

Out[19]:

Month	Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Year
6	24	107	107	107	107	107	107	107	107	107	107	107	107	107

In [20]:
```
complaints[complaints['Received Via']=='Internet'].groupby(['Month','Day']).count().describe()
```

Out[20]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing Behalf Someo
count	90.000000	90.000000	90.000000	90.000000	90.000000	90.000000	90.000000	90.000000	90.000000	90.000000	90.0000
mean	12.277778	12.277778	12.277778	12.277778	12.277778	12.277778	12.277778	12.277778	12.277778	12.277778	12.2777
std	15.848317	15.848317	15.848317	15.848317	15.848317	15.848317	15.848317	15.848317	15.848317	15.848317	15.8483
min	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.0000
25%	6.000000	6.000000	6.000000	6.000000	6.000000	6.000000	6.000000	6.000000	6.000000	6.000000	6.0000
50%	8.000000	8.000000	8.000000	8.000000	8.000000	8.000000	8.000000	8.000000	8.000000	8.000000	8.0000
75%	12.000000	12.000000	12.000000	12.000000	12.000000	12.000000	12.000000	12.000000	12.000000	12.000000	12.0000
max	111.000000	111.000000	111.000000	111.000000	111.000000	111.000000	111.000000	111.000000	111.000000	111.000000	111.0000

In [21]:
```
#Determining the day with the max no. of complaints
df_counts_int = complaints[complaints['Received Via']=='Internet'].groupby(['Month','Day']).count()
df_counts_int[df_counts_int['Customer Complaint']==111]
```

Out[21]:

Month	Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Year
6	24	111	111	111	111	111	111	111	111	111	111	111	111	111

In [22]:
```
df_counts_int.loc[6]
```

Out[22]:

Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Year
4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	7	7	7	7	7	7	7	7	7	7	7	7	7
6	5	5	5	5	5	5	5	5	5	5	5	5	5
13	22	22	22	22	22	22	22	22	22	22	22	22	22
14	6	6	6	6	6	6	6	6	6	6	6	6	6
15	17	17	17	17	17	17	17	17	17	17	17	17	17
16	11	11	11	11	11	11	11	11	11	11	11	11	11
17	17	17	17	17	17	17	17	17	17	17	17	17	17
18	20	20	20	20	20	20	20	20	20	20	20	20	20
19	23	23	23	23	23	23	23	23	23	23	23	23	23
20	4	4	4	4	4	4	4	4	4	4	4	4	4
21	5	5	5	5	5	5	5	5	5	5	5	5	5
22	12	12	12	12	12	12	12	12	12	12	12	12	12
23	94	94	94	94	94	94	94	94	94	94	94	94	94
24	111	111	111	111	111	111	111	111	111	111	111	111	111
25	59	59	59	59	59	59	59	59	59	59	59	59	59
26	31	31	31	31	31	31	31	31	31	31	31	31	31
27	17	17	17	17	17	17	17	17	17	17	17	17	17
28	11	11	11	11	11	11	11	11	11	11	11	11	11
29	22	22	22	22	22	22	22	22	22	22	22	22	22
30	33	33	33	33	33	33	33	33	33	33	33	33	33

In [23]:
```
#Determining the day with the min no. of complaints
df_counts_cust[df_counts_cust['Customer Complaint']==2]
```

Out[23]:

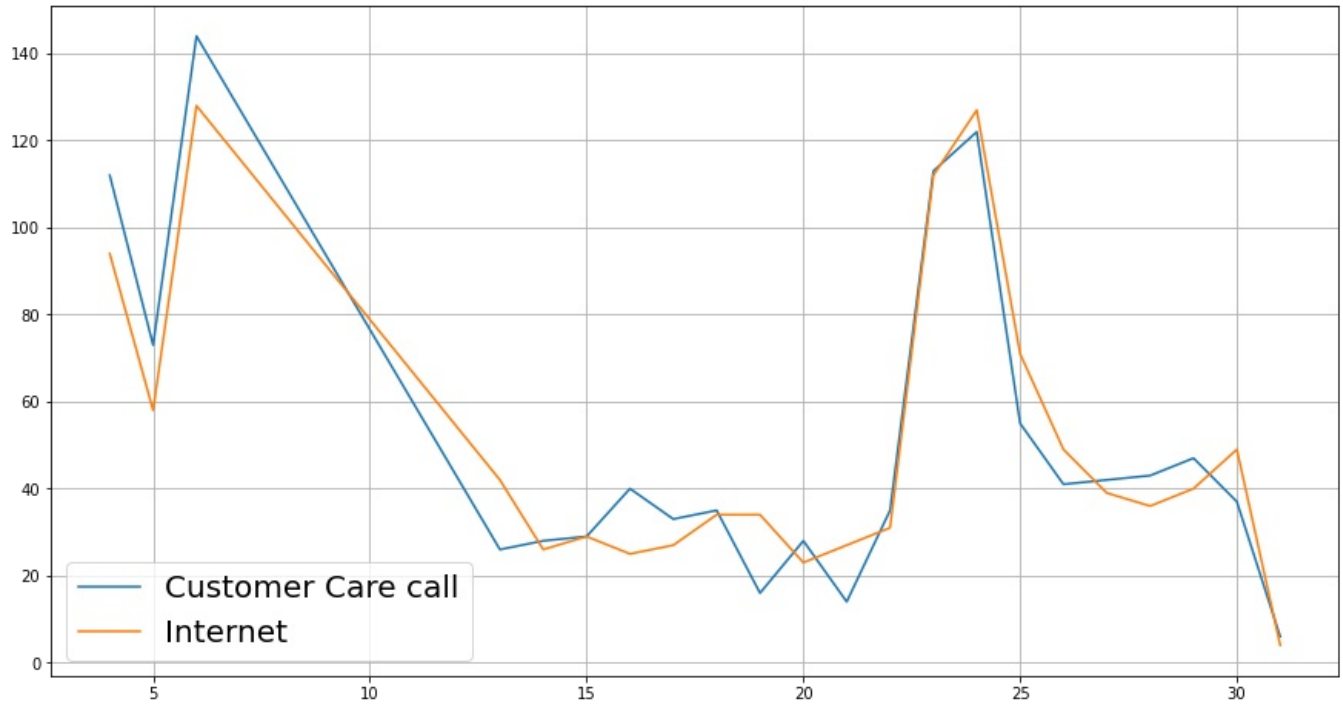
Month	Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Year
4	21	2	2	2	2	2	2	2	2	2	2	2	2	2
10	5	2	2	2	2	2	2	2	2	2	2	2	2	2

In [24]:
```
#Determining the day with the min no. of complaints
df_counts_int[df_counts_int['Customer Complaint']==1]
```

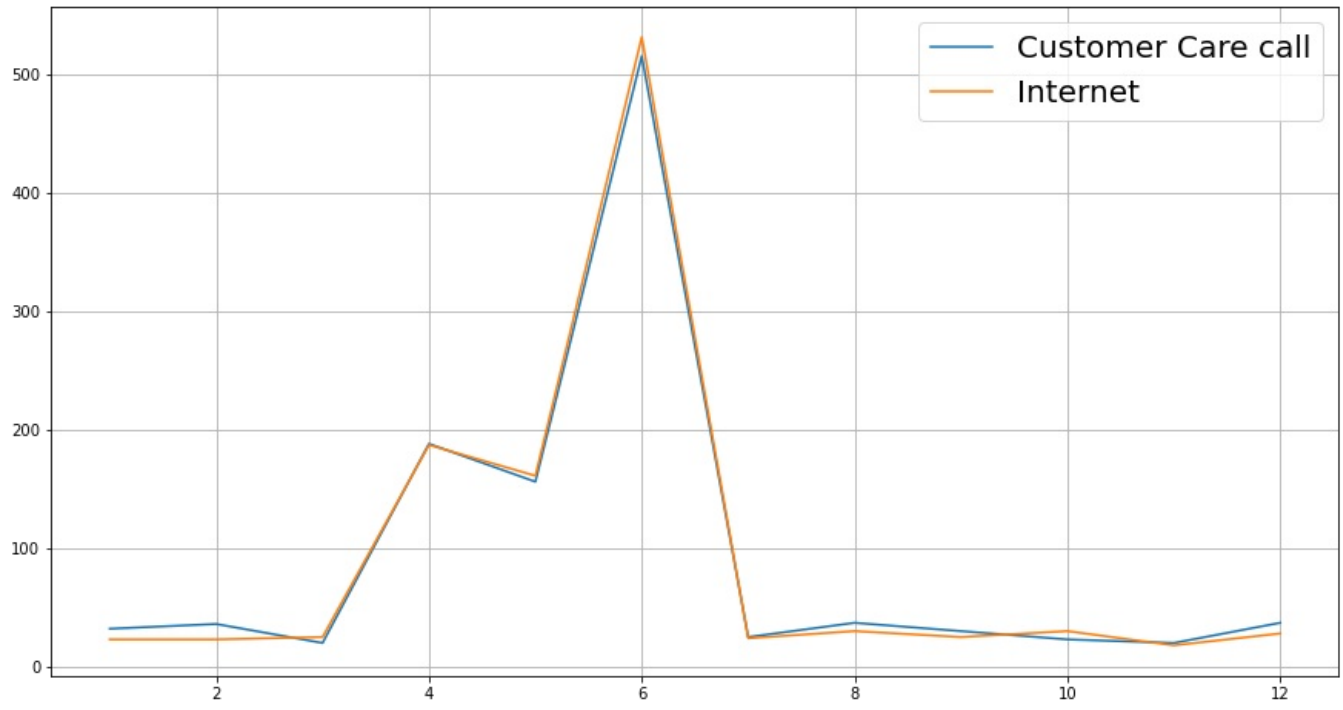
Out[24]:

Month	Day	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Year
11	4	1	1	1	1	1	1	1	1	1	1	1	1	1
12	5	1	1	1	1	1	1	1	1	1	1	1	1	1

In [25]:
```
plt.figure(figsize=(15,8))
plt.plot(complaints[complaints['Received Via']=='Customer Care Call'].groupby('Day').count()['Month'], label='Cus
plt.plot(complaints[complaints['Received Via']=='Internet'].groupby('Day').count()['Month'], label='Internet')
plt.legend(fontsize=20)
#plt.xticks(ticks = complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'], labels=list(range(
#plt.xlim(complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'])
plt.grid(True)
plt.show()
```



In [26]:
```
plt.figure(figsize=(15,8))
plt.plot(complaints[complaints['Received Via']=='Customer Care Call'].groupby('Month').count()['Day'], label='Cus
plt.plot(complaints[complaints['Received Via']=='Internet'].groupby('Month').count()['Day'], label='Internet')
plt.legend(fontsize=20)
#plt.xticks(ticks = complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'], labels=list(range(
#plt.xlim(complaints[complaints['Received Via']=='Customer Care Call']['Timestamp'])
plt.grid(True)
plt.show()
```



As we can observe there is a general pattern for both internet and customer care calls complaints and notice that there isnt any discrepancies/abnormalities on that part. However it is noticed that most of the complaints peak at the 6th month of the year that is june 24th 2015

In [27]:

In [27]:
```
complaints[(complaints['Day']==24) & (complaints['Month']==6)]
```

Out[27]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Day	M
6	361148	Throttling service and unreasonable data caps	24-06-15	24-Jun-15	10:13:55 AM	Customer Care Call	Acworth	Georgia	30101	Pending	No	2015-06-24 10:13:55	24	
16	363695	Internet Availability and Speed	24-06-15	24-Jun-15	11:47:33 PM	Customer Care Call	Alexandria	Indiana	46001	Solved	No	2015-06-24 23:47:33	24	
29	360759	Wifi internet not working as well	24-06-15	24-Jun-15	2:23:23 AM	Internet	Aloha	Oregon	97006	Pending	No	2015-06-24 02:23:23	24	
116	362076	Comcast Atlanta Data Caps	24-06-15	24-Jun-15	2:13:31 PM	Internet	Atlanta	Georgia	30306	Pending	No	2015-06-24 14:13:31	24	
117	362097	Comcast Atlanta Data Caps	24-06-15	24-Jun-15	2:18:32 PM	Internet	Atlanta	Georgia	30324	Pending	No	2015-06-24 14:18:32	24	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2167	362830	Promised Speeds	24-06-15	24-Jun-15	4:57:13 PM	Customer Care Call	West Valley City	Utah	84119	Solved	No	2015-06-24 16:57:13	24	
2188	360866	comcast xfinity internet service.	24-06-15	24-Jun-15	6:45:42 AM	Internet	Windsor	California	95492	Solved	No	2015-06-24 06:45:42	24	
2206	360908	Issues with Comcast billing and equipment	24-06-15	24-Jun-15	8:00:17 AM	Internet	Woodstock	Georgia	30188	Solved	No	2015-06-24 08:00:17	24	
2215	360946	Comcast unfair pricing	24-06-15	24-Jun-15	8:32:24 AM	Customer Care Call	York	Pennsylvania	17403	Solved	No	2015-06-24 08:32:24	24	
2223	363614	Comcast, Ypsilanti MI Internet Speed	24-06-15	24-Jun-15	10:28:33 PM	Customer Care Call	Ypsilanti	Michigan	48198	Open	Yes	2015-06-24 22:28:33	24	

218 rows × 15 columns

Let us look into the type of complaints given by each person

In [28]:
```
def cleaner(x):
    x = re.sub(r'http\S+', '', x) # remove URLs(replacing the urls with nothing)
    x = re.sub(r'[%$#@&)(]', '', x) # remove special characters
    x = re.sub(r'[.,:;]', '', x)
    re_punc = re.compile('[%s]'%re.escape(string.punctuation)) #Prepare regex for char filtering
    x = [re_punc.sub('',w) for w in x.split() if w not in stopwords.words('english')] #reomove punctuations & sto
    x = ' '.join(x)
    return x
```

In [29]:
```
#Let us first clean the complaint types from stopwords and punctuations
complaints['Customer Complaint'] = complaints['Customer Complaint'].apply(cleaner)
```

In [30]:
```
complaints.head()
```

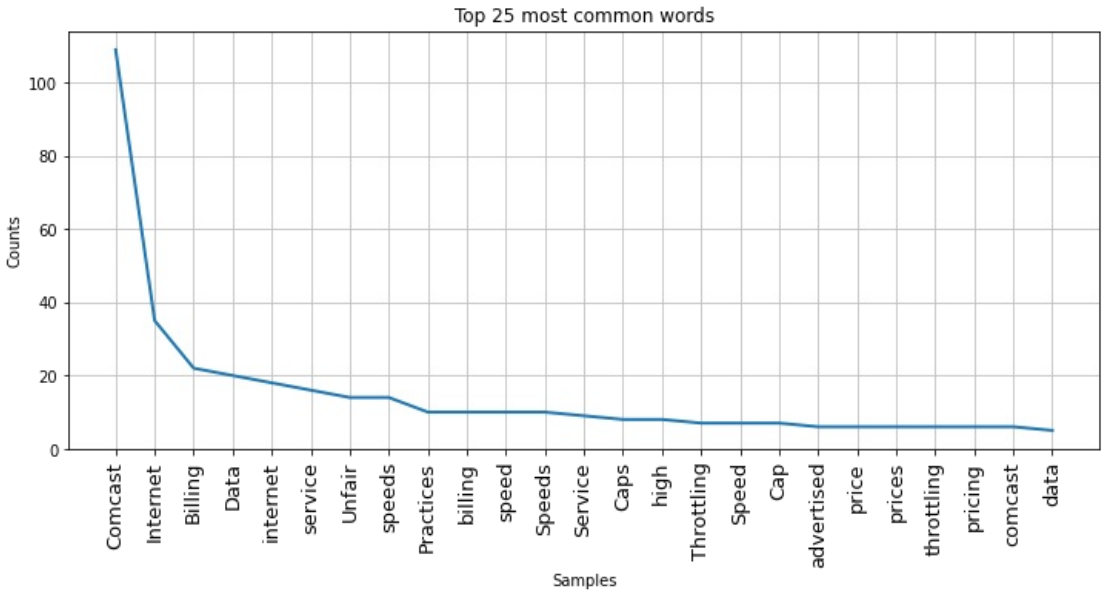
Out[30]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Day	Month	Ye
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	2015-04-22 15:53:50	22	4	20
1	223441	Payment disappear service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	2015-08-04 10:22:56	4	8	20
2	242732	Speed Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	2015-04-18 09:55:47	18	4	20
3	277946	Comcast Imposed New Usage	05-07-	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes	2015-07-05 11:59:35	5	7	20

		Cap 300GB punishes s...	15													
4	307175	Comcast working service boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-05-26 13:25:26	26	5	20	

In [31]:
```
#Checking the frequency plot
all_words = []
for line in list(complaints[(complaints['Day']==24) & (complaints['Month']==6)]['Customer Complaint']):
    words = line.split()
    for word in words:
        all_words.append(word)

plt.figure(figsize=(12,5))
plt.title('Top 25 most common words')
plt.xticks(fontsize=13, rotation=90)
fd = FreqDist(all_words)
fd.plot(25,cumulative=False)
```



Out[31]: <AxesSubplot:title={'center':'Top 25 most common words'}, xlabel='Samples', ylabel='Counts'>

In [32]:
```
text = " ".join(comp for comp in complaints['Customer Complaint'])
print ("There are {} words in the combination of all complaints.".format(len(text)))
```

```
There are 63332 words in the combination of all complaints.
```

In [33]:
```
##Creating the word cloud
#Making a stopword list
stopwords = set(STOPWORDS)
# Generate a word cloud image
wordcloud = WordCloud(stopwords=stopwords, background_color="white").generate(text)
plt.figure(figsize=(15,8))
# Display the generated image:
# the matplotlib way:
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis("off")
plt.show()
```

Here we can observe that the most important key words are Comcast, Data , service, internet and billing.So hence we can infer that the **billing, service** and **internet** are the main issues or complaints faced by a majority of people.

In [34]:
```
complaints['Status'].value_counts()
```

Out[34]:
```
Solved     973
Closed     734
Open       363
Pending    154
Name: Status, dtype: int64
```

In [35]:
```
#Create a new categorical variable with value as Open and Closed. Open & Pending is to be categorized as Open and
def open_close(col):
    if (col == 'Open')| (col =='Pending'):
        return 'Open'
    else:
        return 'Closed'
```

In [36]:
```
complaints['New_stats'] = complaints['Status'].apply(open_close)
```

In [37]:
```
complaints.head()
```

Out[37]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	Timestamp	Day	Month	Ye
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	2015-04-22 15:53:50	22	4	201
1	223441	Payment disappear service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	2015-08-04 10:22:56	4	8	201
2	242732	Speed Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes	2015-04-18 09:55:47	18	4	201
3	277946	Comcast Imposed New Usage Cap 300GB punishes s...	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes	2015-07-05 11:59:35	5	7	201
4	307175	Comcast working service boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No	2015-05-26 13:25:26	26	5	201

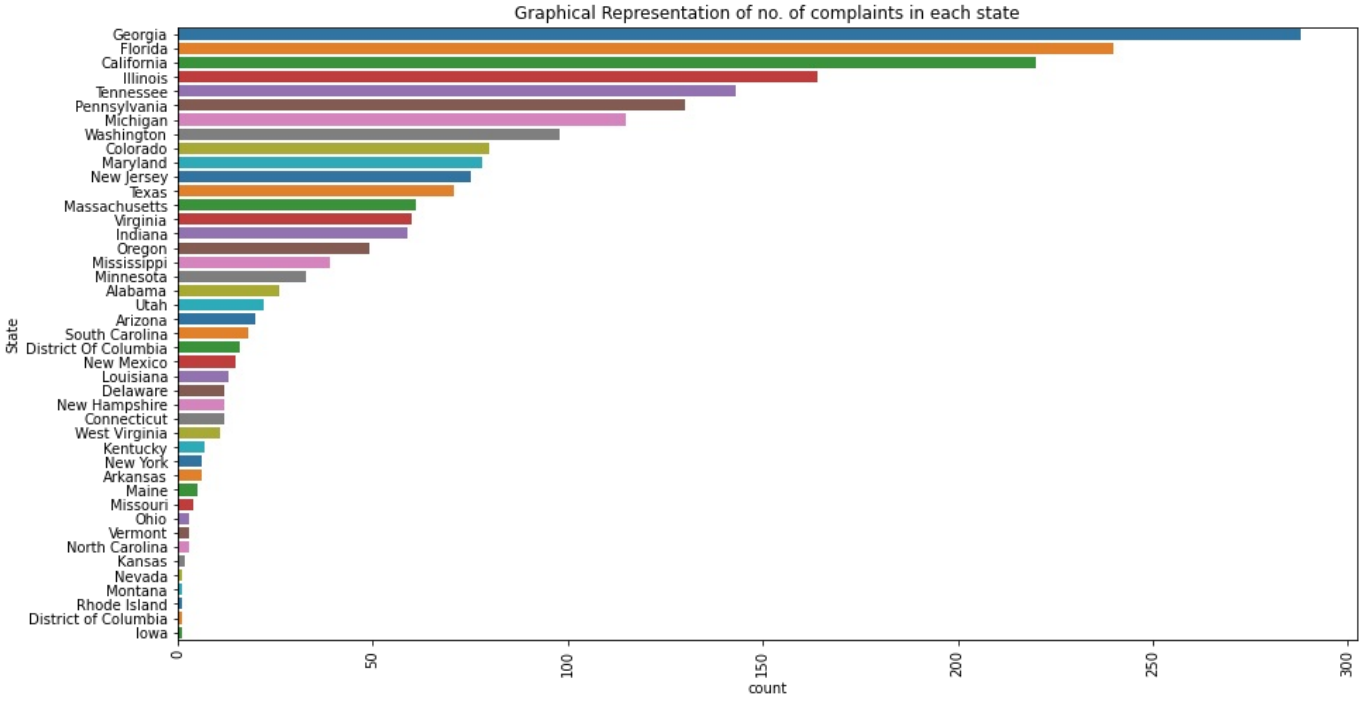
In [38]:
```
complaints.State.value_counts()
```

Out[38]:
```
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     16
New Mexico               15
Louisiana                13
Delaware                 12
New Hampshire            12
Connecticut              12
West Virginia            11
Kentucky                  7
New York                  6
Arkansas                  6
Maine                     5
Missouri                  4
Ohio                      3
Vermont                   3
North Carolina            3
Kansas                    2
Nevada                    1
Montana                   1
Rhode Island              1
District of Columbia      1
Iowa                      1
Name: State, dtype: int64
```

In [39]:

```
plt.figure(figsize=(15,8))
sns.countplot(y ='State',data = complaints,palette = "tab10",order = complaints['State'].value_counts().index)
plt.xticks(rotation=90)
plt.title("Graphical Representation of no. of complaints in each state")
plt.show()
```



In [40]:

```
complaints['State'].value_counts().index[0]
```

Out[40]:

```
'Georgia'
```

We can see that **Georgia** has the maximum number of complaints with a total of 288 complaints seconded by **Florida** with 240 complaints and followed by **California** with 220 complaints.

In [41]:

```
#Which state has the highest percentage of unresolved complaints
complaints[complaints['New_stats']=='Open']['State'].value_counts(normalize=True)*100
```

Out[41]:

```
Georgia                 15.473888
```

Out[41]:

```
California              11.798839
Tennessee                9.090909
Florida                  7.543520
Illinois                 5.609284
Michigan                 4.448743
Washington               4.448743
Texas                    4.255319
Colorado                 4.255319
Pennsylvania             3.868472
New Jersey               3.675048
Mississippi              3.094778
Maryland                 2.901354
Oregon                   2.514507
Massachusetts            2.127660
Virginia                 2.127660
Indiana                  1.740812
Alabama                  1.740812
Arizona                  1.160542
Utah                     1.160542
New Hampshire            0.773694
Delaware                 0.773694
Minnesota                0.773694
New Mexico               0.773694
Connecticut              0.580271
West Virginia            0.580271
South Carolina           0.580271
Kentucky                 0.580271
Maine                    0.386847
District Of Columbia     0.386847
Missouri                 0.193424
Vermont                  0.193424
Kansas                   0.193424
Louisiana                0.193424
Name: State, dtype: float64
```

In [42]:

```
complaints[complaints['New_stats']=='Closed']['State'].value_counts(normalize=True)*100
```

Out[42]:

```
Georgia                 12.185120
Florida                 11.775044
California               9.314587
Illinois                 7.908612
Pennsylvania             6.444054
Tennessee                5.623902
Michigan                 5.389572
Washington               4.393673
Maryland                 3.690685
Colorado                 3.397774
New Jersey               3.280609
Massachusetts            2.929115
Indiana                  2.929115
Texas                    2.870533
Virginia                 2.870533
Oregon                   2.108963
Minnesota                1.698887
Mississippi              1.347393
Alabama                  0.995899
Utah                     0.937317
South Carolina           0.878735
District Of Columbia     0.820152
Arizona                  0.820152
Louisiana                0.702988
New Mexico               0.644405
Connecticut              0.527241
Delaware                 0.468658
West Virginia            0.468658
New Hampshire            0.468658
Arkansas                 0.351494
New York                 0.351494
Kentucky                 0.234329
Missouri                 0.175747
Ohio                     0.175747
Maine                    0.175747
North Carolina           0.175747
Vermont                  0.117165
Nevada                   0.058582
Kansas                   0.058582
Rhode Island             0.058582
Montana                  0.058582
District of Columbia     0.058582
Iowa                     0.058582
Name: State, dtype: float64
```

We noticed that **Georgia** has the highest number of unresolved cases as well.Almost 13% of the cases are from Georgia.

In [43]:
```
#Provide the percentage of complaints resolved till date, which were received through the Internet and customer c
complaints[complaints['New_stats']=='Closed']['Received Via'].value_counts(normalize=True)*100
```

Out[43]:
```
Customer Care Call    50.615114
Internet              49.384886
Name: Received Via, dtype: float64
```

We observe the number of resolved cases through cust care calls and internet are balanced with almost a 50-50 balance.

Conclusion

In this project report, we have

- Observed a similar pattern for both internet and customer care calls complaints. However it is noticed that most of the complaints peak at the 6th month of the year that is june 24th 2015.
- Along with reasonable statistical and visualization proof, we have determined:
  - Most complaints revolve around **billing**,**service**,and the **internet**
  - Georgia has the maximum number of complaints in which most of them are unresolved

This will help in understanding why the company's revenue dropped and the correct prescriptive actions take place.

In [ ]:
```

```