In [ ]:

```
#IMPORTING LIBRARIES
```

In [1]:

```
import numpy as np
import pandas as pd
import datetime
import calendar
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:

```
#READING DATA SETS INTO DATA FRAME
```

In [54]:

```
data1=r'Comcast_telecom_complaints_data.csv'

df=pd.read_csv(data1)
df
```

Out[54]:

	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
...	...	...	...	...	...	...	...	...	...	...	...
2219	213550	Service Availability	04-02-15	04-Feb-15	9:13:18 AM	Customer Care Call	Youngstown	Florida	32466	Closed	No
2220	318775	Comcast Monthly Billing for Returned Modem	06-02-15	06-Feb-15	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2221	331188	complaint about comcast	06-09-15	06-Sep-15	5:28:41 PM	Internet	Ypsilanti	Michigan	48197	Solved	No
		Extremely unsatisfied	23-		11:13:30	Customer					

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
2222	360489	Comcast customer	06-15	23-Jun-15	PM	Care Call	Ypsilanti	Michigan	48197	Solved	No
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

2224 rows × 11 columns

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

In [ ]:

```
#CONVERTING Date_month_year COLUMN TO datetime DATA TYPE
```

In [55]:

```
df['Date_month_year']=pd.to_datetime(df['Date_month_year'])
df
```

Out[55]:

	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	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	04-08-15	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18-04-15	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26-05-15	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No
...	...	...	...	...	...	...	...	...	...	...	...
2219	213550	Service Availability	04-02-15	2015-02-04	9:13:18 AM	Customer Care Call	Youngstown	Florida	32466	Closed	No
2220	318775	Comcast Monthly Billing for Returned Modem	06-02-15	2015-02-06	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2221	331188	complaint about comcast	06-09-15	2015-09-06	5:28:41 PM	Internet	Ypsilanti	Michigan	48197	Solved	No
2222	360489	Extremely unsatisfied Comcast customer	23-06-15	2015-06-23	11:13:30 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2223	363614	Comcast, Ypsilanti MI	24-06-	2015-06-24	10:28:33	Customer	Ypsilanti	Michigan	48198	Open	Yes

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
		Internet Speed	15		PM	Care Call					

2224 rows × 11 columns

In [ ]:

```
#EXTRACTING DAY, MONTH AND ABBREVATING THE MONTH. ADDING THEM TO COLUMNS
```

In [56]:

```
df['Date']=df['Date_month_year'].dt.day
df['Month']=df['Date_month_year'].dt.month.apply(lambda x: calendar.month_abbr[x])
df
```

Out[56]:

	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	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	4	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	5	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No
...	...	...	...	...	...	...	...	...	...	...	...
2219	213550	Service Availability	4	2015-02-04	9:13:18 AM	Customer Care Call	Youngstown	Florida	32466	Closed	No
2220	318775	Comcast Monthly Billing for Returned Modem	6	2015-02-06	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2221	331188	complaint about comcast	6	2015-09-06	5:28:41 PM	Internet	Ypsilanti	Michigan	48197	Solved	No
2222	360489	Extremely unsatisfied Comcast customer	23	2015-06-23	11:13:30 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2223	363614	Comcast, Ypsilanti MI Internet Speed	24	2015-06-24	10:28:33 PM	Customer Care Call	Ypsilanti	Michigan	48198	Open	Yes

2224 rows × 12 columns

In [ ]:

```
#COUNTING COMPLAINTS IN EACH MONTH AND PRESENTING IN DATAFRAME.
```

In [57]:

```
monthly_comp=df['Month'].value_counts().to_frame()
new_order = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov'
, 'Dec']
monthly_comp = monthly_comp.reindex(new_order, axis=0).reset_index().rename(columns={'in
dex':'Month','Month':'no. of complaints'})
monthly_comp
```

Out[57]:

	Month	no. of complaints
0	Jan	55
1	Feb	59
2	Mar	45
3	Apr	375
4	May	317
5	Jun	1046
6	Jul	49
7	Aug	67
8	Sep	55
9	Oct	53
10	Nov	38
11	Dec	65

In [ ]:

```
#COUNTING DAILY COMPLAINTS IN A MONTH AND SHOWING IN DATA FRAME.
```

In [58]:

```
daily_comp=df.groupby(by=['Month','Date']).count()['City'].to_frame().reset_index().rena
me(columns={'City':'no. of complaints'})
daily_comp
```

Out[58]:

	Month	Date	no. of complaints
0	Apr	4	12
1	Apr	5	12
2	Apr	6	12
3	Apr	13	24
4	Apr	14	23
...	...	...	...
86	Oct	5	7
87	Oct	6	25
88	Sep	4	21
89	Sep	5	11
90	Sep	6	23

91 rows × 3 columns

In [ ]:

```
#PLOTTING TREND CHART
```

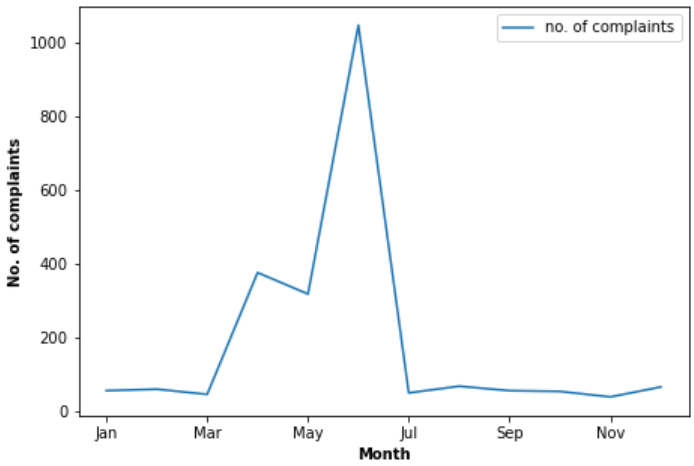
In [59]:

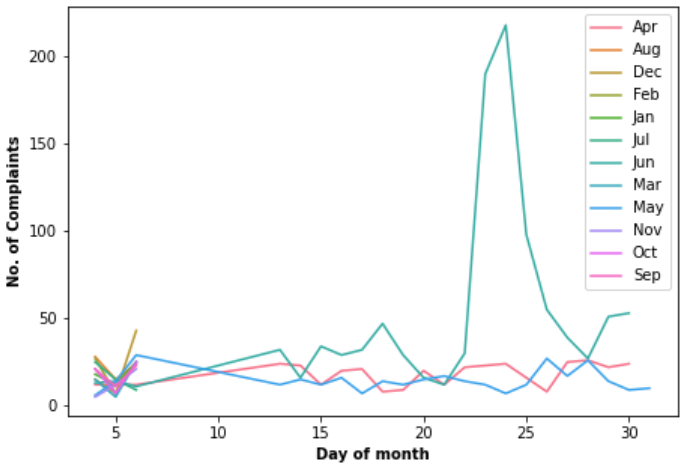
```
fig,ax = plt.subplots(1,2,figsize=(16,5))

monthly = monthly_comp.plot.line(x='Month',y='no. of complaints',ax=ax[0])
monthly.set_xlabel('Month',weight='bold')
monthly.set_ylabel('No. of complaints',weight='bold')
#monthly.set_title('Yearly complaints',weight='bold')

daily = sns.lineplot(x=daily_comp.Date,y=daily_comp['no. of complaints'],hue=daily_comp.M
onth,ax=ax[1])
daily.set_xlabel('Day of month',weight='bold')
daily.set_ylabel('No. of Complaints',weight='bold')
daily.legend(loc='upper right')
#daily.set_title('Monthly complaints in 2015',weight='bold')

plt.show()
```





2.Provide a table with the frequency of complaint types.

In [60]:

```
df_comp_freq=df['Customer Complaint'].value_counts().to_frame().reset_index().rename(col
umns={'index':'Complaint Type','Customer Complaint':'Frequency'})
df_comp_freq
```

Out[60]:

	Complaint Type	Frequency
0	Comcast	83
1	Comcast Internet	18
2	Comcast Data Cap	17
3	comcast	13
4	Data Caps	11
...	...	...
1836	Comcast Internet Only Service	1
1837	Suspected Throttling	1
1838	Xfinity/comcast Service	1
1839	Improper billing from Comcast	1
1840	Comcast / Xfinity overcharging for internet / ...	1

1841 rows × 2 columns

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

In [ ]:

```
#REPLACING COMCAST WITH '' AND DELETING THAT COUNT AS ITS NOT A CLEAR DOMAIN.
```

In [61]:

```
df['revised comp'] = df['Customer Complaint'].apply(lambda x : x.upper().replace('COMCAS
T', ''))
df['revised comp']
df_domain=df['revised comp'].value_counts(ascending=False).to_frame().reset_index().rena
me(columns={'index':'Domain','revised comp':'comp counts'})
df_domain.drop(labels=0,axis=0,inplace=True)
df_domain
```

Out[61]:

	Domain	comp counts
1	DATA CAP	30
2	INTERNET	29
3	DATA CAPS	21
4	BILLING	18
5	INTERNET SPEED	15
...	...	...
1735	FALSE BILLING	1
1736	DISCONTINUATION OF SERVICE ISSUE	1
1737	UNAUTHORIZED 2-YEAR CONTRACT WITH	1
1738	INTERNET PRICING /COMPETITION	1
1739	NEW SIGNUP BILLING BAIT-AND-SWITCH	1

1739 rows × 2 columns

In [ ]:

```
#PRINTING DOMAIN HAVING MAXIMUM COMPLAINTS
```

In [62]:

```
df_domain_max=df_domain.iloc[0]
df_domain_max
```

Out[62]:

```
Domain          DATA CAP
comp counts           30
Name: 1, dtype: object
```

In [ ]:

```

```

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 [63]:

```
df['updated status']=["Open" if x=="Open" or x=="Pending" else "Closed" for x in df['Sta
tus']]
df['updated status'].unique()
df
```

Out[63]:

	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	2015-04-22	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	4	2015-08-04	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18	2015-04-18	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	5	2015-07-05	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26	2015-05-26	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No
...	...	...	...	...	...	...	...	...	...	...	...
2219	213550	Service Availability	4	2015-02-04	9:13:18 AM	Customer Care Call	Youngstown	Florida	32466	Closed	No
2220	318775	Comcast Monthly Billing for Returned Modem	6	2015-02-06	1:24:39 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2221	331188	complaint about comcast	6	2015-09-06	5:28:41 PM	Internet	Ypsilanti	Michigan	48197	Solved	No
2222	360489	Extremely unsatisfied Comcast customer	23	2015-06-23	11:13:30 PM	Customer Care Call	Ypsilanti	Michigan	48197	Solved	No
2223	363614	Comcast, Ypsilanti MI Internet Speed	24	2015-06-24	10:28:33 PM	Customer Care Call	Ypsilanti	Michigan	48198	Open	Yes

2224 rows × 14 columns

5.Provide state wise status of complaints in a stacked bar chart. Use the categorized variable from Q3. Provide insights on:

In [ ]:

```
#COUNTING OPEN AND CLOSED COMPLAINTS FOR EACH STATE
```

In [64]:

```
df.groupby(['State','updated status']).count()['City'].to_frame()
```

Out[64]:

		City
State	updated status	
Alabama	Closed	17

		City
	Open	9
Arizona	Closed	14

State	updated status	
	Open	6
Arkansas	Closed	6
...	...	...
Virginia	Open	11
Washington	Closed	75
	Open	23
West Virginia	Closed	8
	Open	3

77 rows × 1 columns

In [67]:

```
State_newstatus = pd.crosstab(df['State'],df['updated status'])
State_newstatus
```

Out[67]:

updated status	Closed	Open
State		
Alabama	17	9
Arizona	14	6
Arkansas	6	0
California	159	61
Colorado	58	22
Connecticut	9	3
Delaware	8	4
District Of Columbia	14	2
District of Columbia	1	0
Florida	201	39
Georgia	208	80
Illinois	135	29
Indiana	50	9
Iowa	1	0
Kansas	1	1
Kentucky	4	3
Louisiana	12	1
Maine	3	2
Maryland	63	15
Massachusetts	50	11
Michigan	92	23
Minnesota	29	4
Mississippi	23	16
Missouri	3	1
Montana	1	0
Nevada	1	0
New Hampshire	8	4

updated status State	Closed	Open
New Jersey	56	19
New Mexico	11	4
New York	6	0
North Carolina	3	0
Ohio	3	0
Oregon	36	13
Pennsylvania	110	20
Rhode Island	1	0
South Carolina	15	3
Tennessee	96	47
Texas	49	22
Utah	16	6
Vermont	2	1
Virginia	49	11
Washington	75	23
West Virginia	8	3

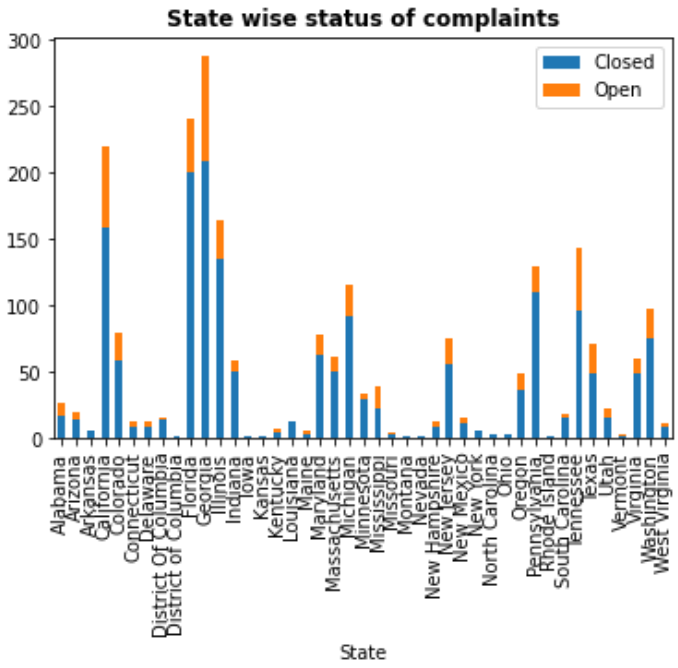
In [68]:

```
plt.figure(figsize=(100,15))

State_newstatus.plot(kind='bar',stacked=True)
plt.title('State wise status of complaints',weight='bold')
plt.legend(loc='best')

plt.show()
plt.tight_layout()
```

```
<Figure size 7200x1080 with 0 Axes>
```




```
<Figure size 432x288 with 0 Axes>
```

6.Which state has the maximum complaints

In [69]:

```
max_state_comp=df['State'].value_counts()[df['State'].value_counts()==df['State'].value_
counts().max()]
```

```
max_state_comp.to_frame().reset_index().rename(columns={'index':'State','State':'Complaints'})
```

Out[69]:

	State	Complaints
0	Georgia	288

7.Which state has the highest percentage of unresolved complaints

In [70]:

```
df3=df[df['updated status'] =='Open']
df4=df3['State'].value_counts(normalize=True).reset_index().iloc[0]
df4
```

Out[70]:

```
index     Georgia
State    0.154739
Name: 0, dtype: object
```

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

In [ ]:

```
#BREAK UP OF TOTAL COMPLAINTS RECEIVED VIA CALLS AND INTERNET
```

In [71]:

```
df_resolved=df[ (df['updated status']=='Closed') ]
c1=df.groupby(by='Received Via', as_index=True)['Ticket #'].count()
c1
```

Out[71]:

```
Received Via
Customer Care Call    1119
Internet              1105
Name: Ticket #, dtype: int64
```

In [ ]:

```
#PERCENTAGE OF CLOSED COMPLAINTS
```

In [72]:

```
df_percentage=df.groupby(by='Received Via', as_index=True)['Ticket #'].count().apply(lambda x : x/c1.sum()*100)
df_percentage
```

Out[72]:

```
Received Via
Customer Care Call    50.314748
Internet              49.685252
Name: Ticket #, dtype: float64
```

In [ ]:

```

```

In [ ]:

```

```

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

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