Import data into Python environment.

In [2]:

```
# Import data into Python environment.
import pandas as pd
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
df = pd.read_csv("Comcast_telecom_complaints_data.csv")
```

In [3]:

```
df.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

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

In [29]:

```
df['Date'] = pd.to_datetime(df['Date'],format='%d-%m-%y')
```

In [30]:

```
grouped_by_month = df.groupby(df['Date'].dt.strftime('%m')).size()
```

In [31]:

```
grouped_by_month
```

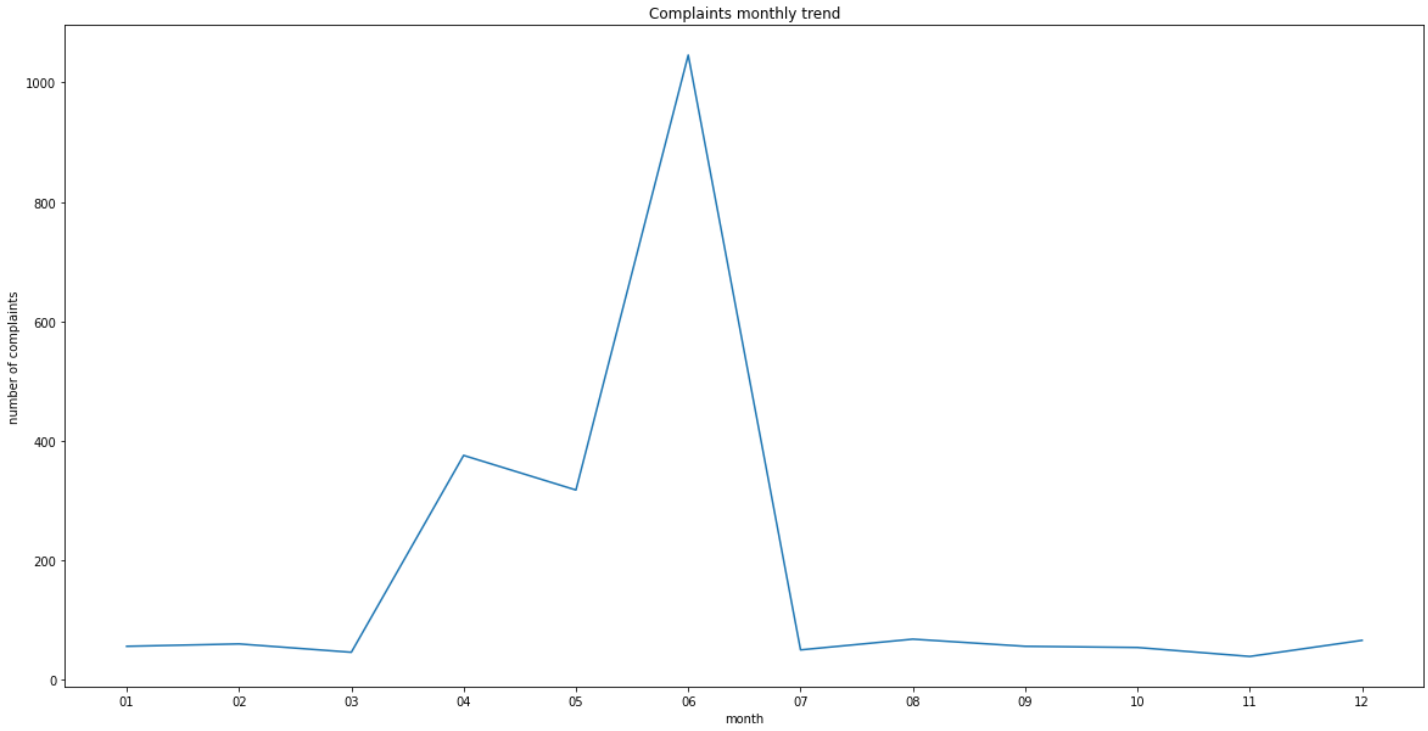
Out[31]:

```
Date
01       55
02       59
03       45
04      375
05      317
06     1046
07       49
08       67
09       55
```

```
10      53
11      38
12      65
dtype: int64
```

In [40]:

```
# to plot the graph
grouped_by_month.plot(x="lab", y="val", kind="line", figsize=(20, 10))
month_plot = plt.title('Complaints monthly trend')
plt.xlabel("month")
plt.ylabel("number of complaints")
plt.xticks(np.arange(12), grouped_by_month.index)
plt.show()
```



In [41]:

```
grouped_by_day = df.groupby(df['Date']).size()
grouped_by_day
```

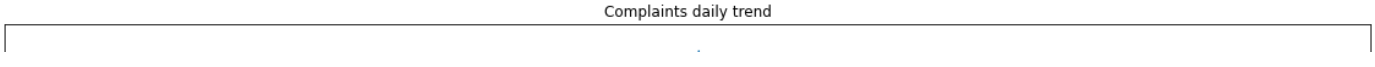
Out[41]:

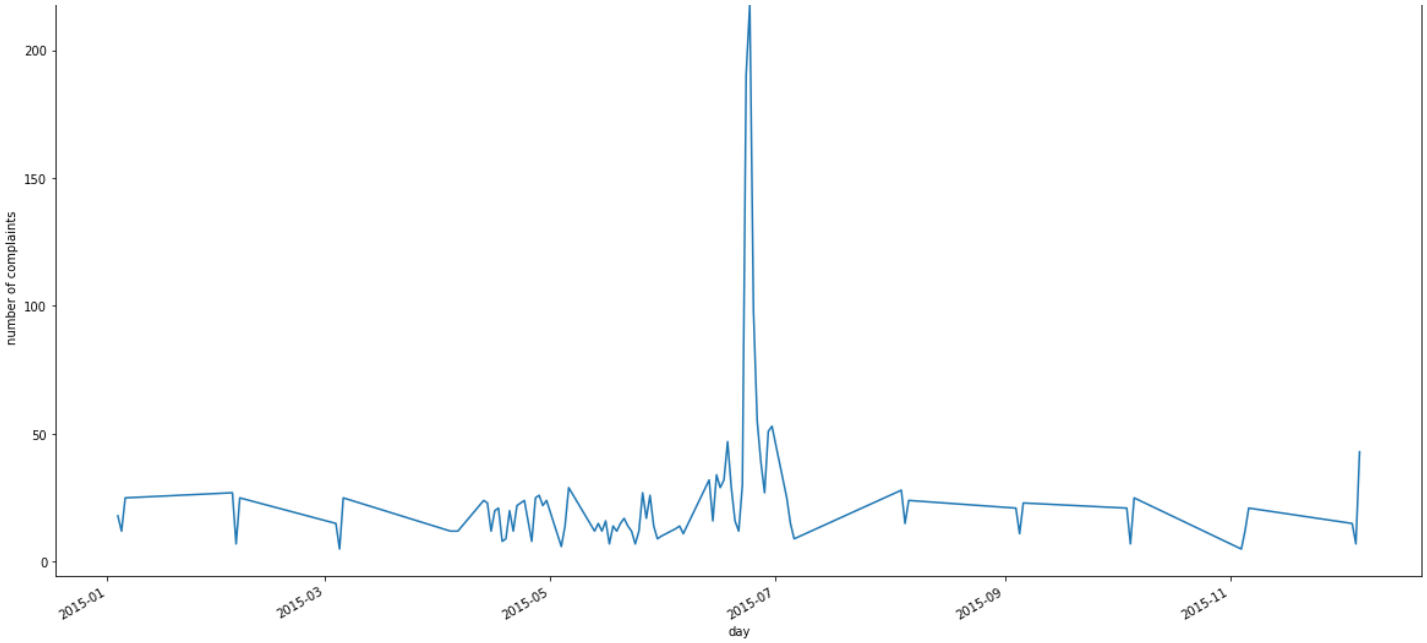
```
Date
2015-01-04    18
2015-01-05    12
2015-01-06    25
2015-02-04    27
2015-02-05     7
              ..
2015-11-05    12
2015-11-06    21
2015-12-04    15
2015-12-05     7
2015-12-06    43
Length: 91, dtype: int64
```

In [43]:

```
# to plot the graph
grouped_by_day.plot(x="lab", y="val", kind="line", figsize=(20, 10))
month_day = plt.title('Complaints daily trend')
plt.xlabel("day")
plt.ylabel("number of complaints")

plt.show()
```





Provide a table with the frequency of complaint types

In [10]:

```
def set_complaint_type(complaint_text:str):
    complaint_text = complaint_text.lower()
    if('network' in complaint_text):
        return 'network'
    elif('internet' in complaint_text):
        return 'internet'
    else:
        return 'other'

df['complaint_type'] = df['Customer Complaint'].apply(set_complaint_type)
df.head()
```

Out[10]:

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

In [11]:

```
grouped by type = df.groupby('complaint type').size()
```

```
grouped_by_type
```

Out[11]:

```
complaint_type
internet      532
network         2
other        1690
dtype: int64
```

most complaints are in the 'other' catagory

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 [12]:

```
def set_complaint_status(current_status:str):
    if( current_status == 'Closed' or current_status == 'Solved'):
        return "Closed"
    else:
        return "Open"
```

In [13]:

```
df['modified_status'] = df.Status.apply(set_complaint_status)
```

In [14]:

```
df.shape
```

Out[14]:

```
(2224, 13)
```

In [15]:

```
df.head()
```

Out[15]:

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

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

In [16]:

```
grouped_by_status = df.groupby('modified_status').size()
```

In [17]:

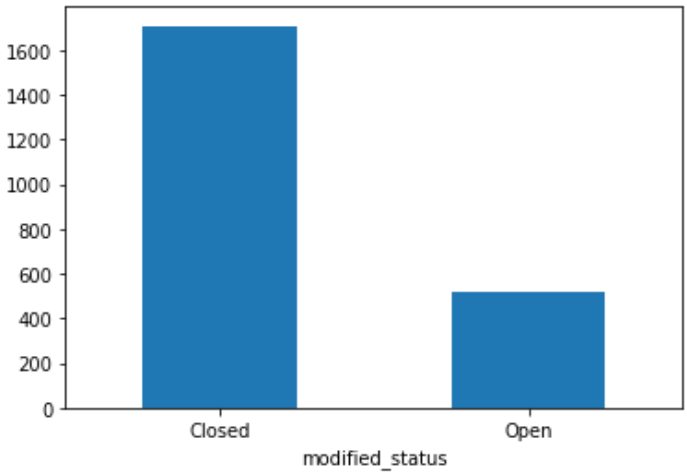
```
grouped_by_status
```

Out[17]:

```
modified_status
Closed    1707
Open       517
dtype: int64
```

In [18]:

```
ax = grouped_by_status.plot.bar(x='lab', y='val', rot=0)
```



In [19]:

```
grouped_by_state = df.groupby(['State', 'modified_status']).size().unstack().fillna(0)
```

In [20]:

```
grouped_by_state
```

Out[20]:

modified_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
Delaware	8.0	4.0
District Of Columbia	14.0	2.0
District of Columbia	1.0	0.0
Florida	201.0	39.0
Georgia	208.0	80.0
Illinois	135.0	29.0

modified_status	Closed	Open
Indiana	50.0	9.0
Iowa	1.0	0.0
Iowa State		
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
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

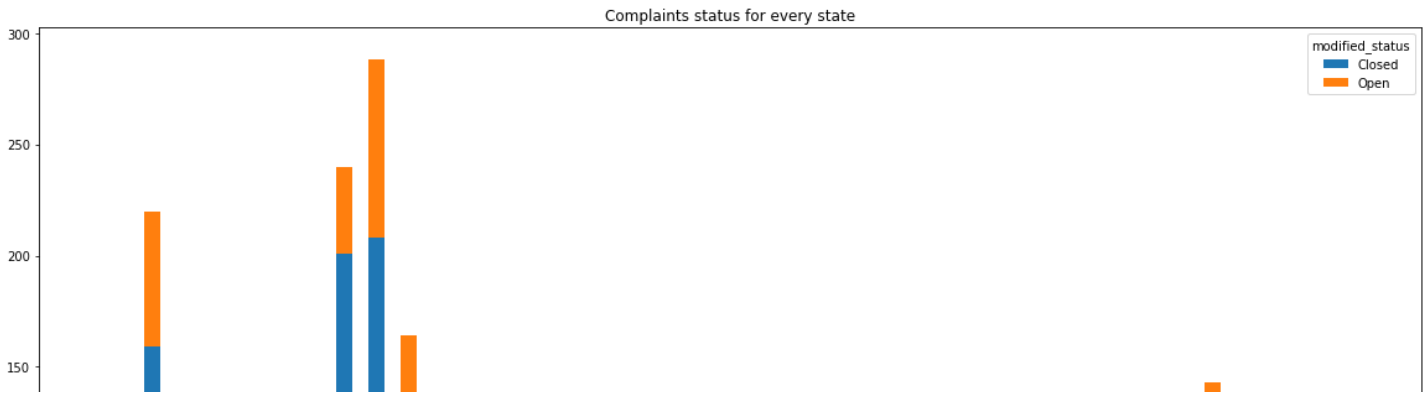
In [21]:

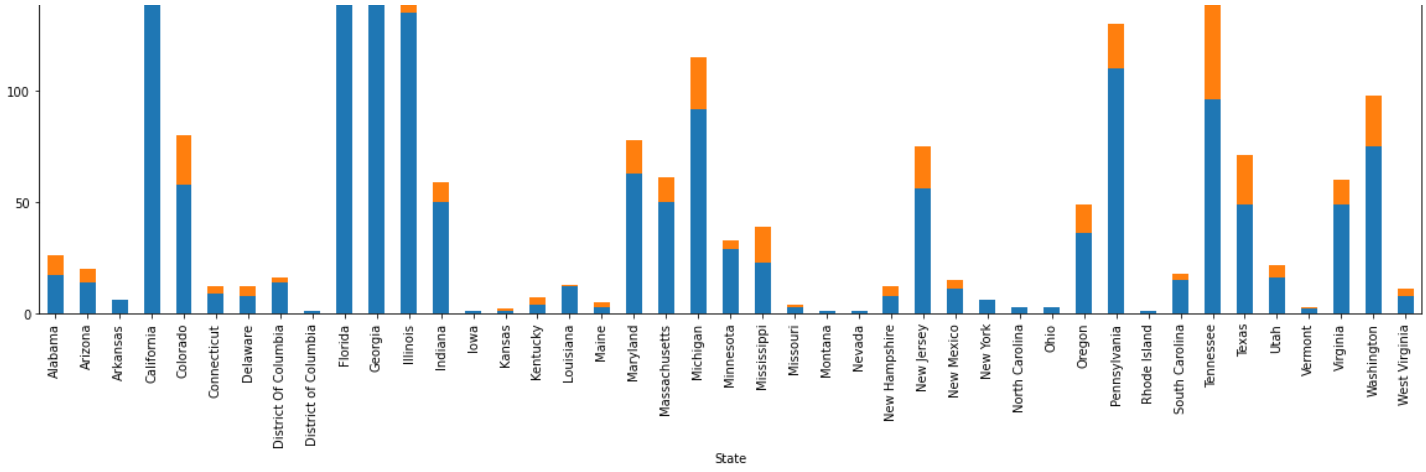
```
grouped_by_state.plot(kind='bar', stacked=True, figsize=(20, 10))

plt.title('Complaints status for every state')
```

Out[21]:

```
Text(0.5, 1.0, 'Complaints status for every state')
```





Q: Which state has the maximum complaints

A: From the stacked bar chart we can see that the state of Georgia has the maximum number of complaints

Q: Which state has the highest percentage of unresolved complaints

In [22]:

```
grouped_by_state['unresolved_perc']= (grouped_by_state['Open']/(grouped_by_state['Open']
+ grouped_by_state['Closed'])) * 100
```

In [23]:

```
grouped_by_state.head()
```

Out[23]:

modified_status	Closed	Open	unresolved_perc
State			
Alabama	17.0	9.0	34.615385
Arizona	14.0	6.0	30.000000
Arkansas	6.0	0.0	0.000000
California	159.0	61.0	27.727273
Colorado	58.0	22.0	27.500000

In [24]:

```
grouped_by_state['unresolved_perc'].idxmax()
```

Out[24]:

```
'Kansas'
```

A: As the previous step shows *Kansas* is the state which has the highest percentage of unresolved-to-resolved complaints ratio (50%). As for the states that has the heighest number of unresolved complaints among all states the figure shows that it's also the state of Georgia

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

In [25]:

```
pd.unique(df['Received Via'])
```

Out[25]:

```
array(['Customer Care Call', 'Internet'], dtype=object)
```

In [26]:

```
grouped_by_recieved = df.groupby(['Received Via', 'modified_status']).size().unstack().f
illna(0)
```

In [27]:

```
grouped_by_recieved['resolved_perc']= (grouped_by_recieved['Closed']/(grouped_by_recieved
['Open'] + grouped_by_recieved['Closed'])) * 100
```

In [28]:

```
grouped_by_recieved
```

Out[28]:

modified_status	Closed	Open	resolved_perc
Received Via			
Customer Care Call	864	255	77.211796
Internet	843	262	76.289593

In [ ]:

```

```